"EVALUATION OF POSTERIOR SEGMENT IN OPAQUE MEDIA BY BSCAN BY CROSS-SECTIONAL STUDY"

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LIST OF ABBREVIATIONS USED

AC	Anterior Chamber
CD	Choroidal Detachment
CT	Computed Tomography
DOV	Diminution Of Vision
IOFB	Intraocular Foreign Body
MRI	Magnetic Resonance Imaging
OCT	Optical Coherence Tomography
OD	Oculus Dexter
OS	Oculus Sinister
PHPV	Persistent Hyperplastic Primary Vitreous
PVD	Posterior Vitreous Detachment
RD	Retinal Detachment
TRD	Tractional Retinal Detachment
USG	Ultrasonography
VH	Vitreous Hemorrhage

ABSTRACT

INTRODUCTION:

Eye is affected by a spectrum of pathological conditions occurring in all age groups from new born to old age. Clinical examination and ophthalmoscopy forms the basis of diagnosis in most patients with eye disease but in many cases, especially when the clinical examination of the ocular fundus is difficult, other techniques will be required, ultrasound being one of them.

Ultrasound is a safe technique, cheaper and more affordable compared to other techniques. Dynamic examination is important and with B-scan ultrasound it's possible to study characteristics of the motion and topography of pathological intraocular conditions. Echography has become the most important method for evaluating an eye with opaque ocular media. It provides an instantaneous 'glimpse' into the eye and, in many instances can yield information not obtainable by any other method.

OBJECTIVES:

To evaluate the status of the posterior segment of the eye with B-scan ultrasound in the event of non-visualisation of fundus.

MATERIALS AND METHODS:

The descriptive study was conducted on patients attending/referred to the Outpatient Department of Ophthalmology in KLES Hospital, Belagavi from January 2015 to December 2015 for evaluation of the posterior segment of the eye.250 patients were evaluated using a standard USG machine (SONOMED) equipped with a real-time

high-frequency probe with the contact method. The probe was placed over the closed eyelid after application of a coupling gel.

RESULTS:

Highest number of cases was seen in the age group of 51 to 60 years which accounted for 18% of cases. Commonest clinical presentations were diminution of vision . The commonest sites of media opacity were found to be in the lens (61%) and the vitreous (12%).Common pathologies detected were retinal detachment, vitreous hemorrhage and posterior vitreous detachment. Out of the 250 patients studied, 11 patients (4%) had retinal detachment, 24 patients (10%) had posterior vitreous detachment, 3 patients (1%) had vitreous hemorrhage, 13 patients (5%) had diffuse vitreous opacities, 8 patients (3%) had vitreous degeneration, 3 patients (1%) had posterior staphyloma, 2 patients (1%) had retinal detachment with posterior staphyloma, 1 patients had vitreous hemorrhage with retinal detachment, 1 patient (0.8%) had subhyaloid hemorrhage, 1 patient (0.4%) had choroidal detachment, 1 patient (1%) had optic disc coloboma, 2 patients had previously implanted scleral buckle.

CONCLUSION:

B-scan ultrasound is a simple, safe, non-invasive, cost-effective, easily available, reproducible and quick investigative technique which proves accurate and beneficial in opaque ocular media to detect posterior segment pathologies. It is advisable to all patients who present with opaque ocular media as a screening device for ocular pathology which will facilitate early diagnosis and management of diseases like retinal detachment and intraocular tumours. With understanding of the indications for

ultrasonography and proper examination techniques, one can gather a vast amount of information not possible with clinical examination alone.

KEYWORDS:

High resolution, B-scan ultrasonography, Posterior segment, Opaque ocular media, Retinal detachment, Posterior vitreous detachment.

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INTRODUCTION

Eye is affected by a spectrum of pathological conditions occurring in all age groups from new born to old age. Although clinical examination and ophthalmoscopy are the basis of diagnosis in most patients with eye disease, in many cases, especially when the clinical examination of the ocular fundus is difficult, other techniques will be required, ultrasound being one of them[1].

Ultrasound is an oscillating sound pressure wave with a frequency greater than the upper limit of the human hearing range. In 1880, French Scientist Curie brothers described the "Piezoelectric Phenomenon" upon which the current diagnostic ultrasound is based.[2] Ultrasound technology, also known as sonar, echography or acoustic imaging, was developed during world war-I as a method of detecting under water objects, including submarines.[3] Mundt and Hughes first reported the use of ultrasound in ophthalmic diagnosis in 1956.[4] They utilized A-scan mode. Two years later, Baum and Greenwood described B-scan ophthalmic ultrasonography.[5]

Ultrasound is a safe technique, cheaper and more affordable compared to other techniques that would also provide good data (such as OCT, CT, MRI).[6] Although CT and MRI are invaluable in many ocular conditions, they lack the immediacy and simplicity of ultrasound, cannot produce real time images, and have considerable limitations when imaging the vitreous and the retina whereas ultrasound contributes more to tissue diagnosis. Dynamic examination is important and with B-scan ultrasound it's possible to study characteristics of the motion and topography of pathological intraocular conditions, enabling identification of detachment of vitreous membranes and vitreoretinal adhesions.[7]

The clinical use of ophthalmic ultrasound has increased dramatically over the past twentyyears and has presently reached the point where it is universally regarded as an essential means of soft tissue examination of the eye and orbit.[8]

Both A (Amplitude) scan and B (Brightness) scan techniques are important for the diagnosis of posterior segment lesions. B scan (brightness) mode is useful for a better demonstration of the shape and topographic relationship of lesions in the posterior segment.[6]

Echography has become the most important method for evaluating an eye with opaque ocular media. It provides an instantaneous 'glimpse' into the eye and, in many instances can yield information not obtainable by any other method.

With understanding of the indications for ultrasonography and proper examination technique, one can gather a vast amount of information not possible with clinical examination alone. Over the last 30 years, ultrasound has greatly advanced and now its most common use is in contact mode for evaluation of the posterior segment in eyes with media opacification. Situations that prevent normal examination of fundus include lid problems (e.g. severe oedema, partial or total tarsorrhaphy), corneal opacities (e.g. scars, severe oedema), hyphema, hypopyon, miosis, pupillary membranes, dense cataracts, or vitreous opacities (e.g. hemorrhage, inflammatory debris). In such cases, diagnostic B-scan ultrasound can accurately image intraocular structures and give valuable information on the status of the lens, vitreous, retina, choroid, and sclera.[6]

The purpose of the study is to visualise the status of the posterior segment of the eye with the diagnostic tool of B-scan ultrasound in the presence of media opacity and to diagnose any posterior segment pathology in such cases.

AIMS AND OBJECTIVES

Aims of the study:

To evaluate the posterior segment pathologies in cases of opaque media by Bscan.

Objective of the study:

Evaluating the status of the posterior segment of the eye in the presence of opaque media by Bscan as a diagnostic tool.

REVIEW OF LITERATURE

HISTORY

In 1956, ultrasound was used in ophthalmology for the very first time by two American ophthalmologists, Mundt and Hughes.[9] They showed that ultrasound had potential as a diagnostic tool in ophthalmology after using time amplitude-mode (A-scan) to evaluate an intraocular tumour.

Soon afterward, Oksala and associates, in Finland, greatly expanded the use of A-scan for the diagnosis of intraocular disorders.[10]They also published data regarding the sound velocities of various components of the eye.[11]

In 1958, Baum and Greenwood[12] co-developed the first two-dimensional (immersion) brightness-mode (B-scan) ultrasound instrument for ophthalmology.

In the early 1960s, Jansson and associates,[13,14]in Sweden, used ultrasound to measure the distances between structures in the eye.

Further pioneering work with immersion B-scan was carried out by Purnell.[15]

In the early 1970s, Coleman and associates[16-18] developed the first commercially available immersion B-scan instrument. In 1977, they were the first to describe a method of ultrasonic tissue characterization using spectrum analysis.[19,20]

Shortly thereafter, Bronson[21] introduced a portable contact B-scan machine which allowed placement of the probe on closed eyelids. With the development of this instrument, ultrasound began to be a useful component of the everyday practice of ophthalmology.

In the 1960s, Ossoinig[22] an Austrian ophthalmologist, first emphasized the importance of standardizing instrumentation and techniques so that echographers could rely on the results of fellow investigators using similar instrumentation and techniques. He developed the first standardized A-scan instrument, the Kretztechnik 7200MA which allowed reliable differentiation of tissue. He was also the first to develop Standardized Echography[23,24], a method that has proved to be highly accurate for the detection and differentiation of both intraocular and orbital disorders.

In the early 1990s, Pavlin and associates popularized the use of high frequency ultrasound instrumentation for evaluation of the anterior segment.[25-28]

Doppler ultrasound has been used in ophthalmology since the early 1970s. In the late 1980s, Colour Doppler Imaging (CDI) began to be used for the assessment of ocular and orbital disorders. [18,23,29]

In recent years, the digitalization of ultrasound has greatly enhanced its potential and clinical applications. This computerization has made possible the development of three-dimensional ultrasound imaging in ophthalmology.[30]

The most common indication for ultrasonographic imaging of the posterior segment is vitreoretinal disease. In situations where there is media opacity (e.g. because of vitreous hemorrhage, cataract etc.), echography allows for evaluation of the vitreous, retina, and choroid that would otherwise not be possible. Using ultrasound, it is possible to identify, evaluate, and follow numerous posterior segment conditions such as retinal tears, vitreous and retinal detachments, retinoschisis, retinal pigment epithelium (RPE) detachment, sub retinal hemorrhage, and eccentric disciform lesions.[31]

In the study done by Manzoor A Qureshi and Khalida Laghari at Quassim University, B-scan ultrasound was perfomed on 750 patients with dense cataract. Out of 750 patients, 90 patients had posterior segment lesions. Out of 90 positive cases, 25 had retinal detachment, 14 had posterior vitreal detachment, 24 had vitreous hemorrhage, 12 were asteroid hyalosis, while posterior staphyloma and intraocular foreign body were found with the frequency of 9 and 6 respectively. The study concluded that B-scan ultrasound can be one of the diagnostic tool for the detection of hidden posterior segment lesion and can be performed routinely in pre-op cataract patients as this would help in surgical planning.[32]

A retrospective and observational study done by Ejaz Ahmed Javed, Aamir Ali Ch., Iftikhar Ahmad, Mehmood Hussain in Pakistan on 463 cases having opaque media due to trauma, diabetes mellitus, hypertension, congenital or acquired mature cataract, corneal dystrophy, leucocoria and Eale's disease showed that out of the 463 patients, 20 had only corneal pathology, 90 had mature cataract, 60 had only vitreous hemorrhage, 68 had only retinal detachment, 51 had tractional retinal detachment, 4 had retinoblastoma, 2 had optic nerve anomaly, 2 had choroidal pathology, 2 had persistent hyperplastic primary vitreous, and 1 had asteroid hyalosis. The study concluded that B scan proved to be a valuable diagnostic modality in opaque media and had remarkable prognostic importance.[33]

Contact ultrasonography was done in 175 cases of recent and old traumatized eye in the presence of opaque ocular media. The more common pathological lesions detected were vitreous hemorrhage (34%), dislocated lens + retinal detachment + cataract (33%), intraocular foreign body (12%), globe rupture (14%), tractional

detachment (10%). So this study helped in predicting possible prognosis in addition to proper planning and execution of surgery.[34]

Study conducted by*Haile M, Mengistu Z*in published in East African Journal Ethiopia showed that when real time B-scan ultrasonography was utilised on 318 eyes of 298 patients for evaluation of 285 (90%) eyes with opaque media, three (1%) eyes with clear media but suspected intraocular abnormalities and for proptosis in 30 (9%) cases; two hundred and nine (66%) eyes had one or more detectable abnormalities. The most common abnormality was retinal detachment (39%) followed by vitreous opacities (31%), eyeball size abnormalities (12%), intraocular foreign bodies (4%), posterior staphyloma (3%) and retinal detachment with vitreous opacities (2%). In areas where other imaging techniques are not available, the procedure is a valuable method of evaluating the eye and orbit for any detectable abnormalities and for planning management.[35]

Sonography of the eye has several advantages over other imaging modalities in children. CT and MRI require a patient to keep their gaze fixed during the study as any eye movement significantly impairs image quality. This often necessitates sedation/general anaesthesia in young children (under the age of 5-8 years). By contrast, sonography can provide useful data in non sedated children of any age. Eye movement during sonography is well tolerated and is often of value in localizing abnormalities and defining their extent and mobility which may help in diagnosis. Sonography is very sensitive to the presence of calcification which can be a distinguishing feature in retinoblastoma. Sonography is especially useful in the evaluation of eyes with opaque media that obscure underlying structures. This includes leucocoria, which is a common presenting symptom in children. It's

important to differentiate retinoblastoma from multitude of other possible causes of leucocoria which include corneal opacity, cataract, persistent hyperplastic primary vitreous, Norrie's disease, retrolental fibroplasias, toxocara granulomatosis, uveal coloboma, Coat's disease, sclerosing endophthalmitis and long standing retinal detachment.[36]

A prospective diagnostic study conducted by Jatin Garg, Eva Tirkey, Shashi Jain, Sujata Lakhtakia, Anamika Tiwari Journal of Evolution of Medical and Dental Sciences 2015; to determine the relevance and prevalence of posterior segment abnormalities in patients with dense cataracts prior to surgery by ultrasonography showed 26 (16.4%) patients, out of total 158 patients, had posterior segment lesions. Among traumatic group of 22 patients, 15 (68.1%) had positive posterior segment lesions, while only 11 (8%) patients in the non-traumatic group of 136 patients had positive posterior segment lesions. Out of the 26 positive cases, retinal detachment was found in 8 (5%) patients, 7 (4.4%) had posterior vitreous detachment, 7 (4.4%) had vitreous hemorrhage, 2 (1.26%) had retinal detachment with vitreous hemorrhage, 1 (0.63%) had asteroid hyalosis, 1 (0.63%) had intraocular foreign body. The study concluded that B-scan ultrasound has significant importance in the preoperative evaluation of patients with dense cataracts to detect pathologies that may influence the surgical strategy and the postoperative visual prognosis.[37]

A 6 month prospective study conducted by K.K. Nischal, J.N. James and McAllister to determine the usefulness of B-scan ultrasound in detecting retinal tears in spontaneous vitreous hemorrhage. Eight patients in total were included in the study; of these, 4 were thought to have retinal tear at initial ultrasound examination and this was confirmed later when the hemorrhage cleared. The study suggested that

detection of small to moderate size retinal tears in spontaneous vitreous hemorrhages and planning of appropriate management is possible using dynamic B-scan ultrasound.[38]

A descriptive study was conducted by Ch. Srinivasa Murty, B.K.Vinod Kumar, N.Ratna Kumari where patients who were suspected to have posterior segment involvement of pathology due to blunt trauma were subjected to B-scan ultrasound. Out of the total 50 cases enrolled, vitreous hemorrhage in association with lens dislocation/subluxation was seen in 6 cases, vitreous hemorrhage with globe rupture in 4 cases, posterior vitreous detachment in 4 cases, retinal detachment in 3 cases, retinal detachment with vitreous hemorrhage in 5 cases, retinal detachment with traumatic cataract in 2 cases, hemorrhagic choroidal detachment in 2 cases, choroidal thickening with vitritis was seen in 2 cases , lens dislocation alone in 3 cases and lens dislocation associated with vitreous hemorrhage was seen in 4 cases. The study concluded that ultrasound was the most practical method of obtaining images of the posterior segment of the eye, especially when the light conducting media is opaque.[39]

A study was conducted by Piyya Muhammad Musammat Rafi, Muhammad Rizwan Khan, Muhammad Naeem Azhar to evaluate the frequency of posterior segment pathologies determined by B-scan ultrasonography in patients with congenital cataract. On B-scan ultrasonography seventeen eyes (7.17%) showed findings suggestive of posterior segment pathology, while two hundred and twenty (92.83%) eyes showed no pathology in the posterior segment. The most common finding was in the vitreous. Five (2.5%) eyes showed persistent fetal vasculature (PHPV) and three (1.5%) showed hemorrhage. Intraocular tumour was present as

elevated fundus lesion in 3 (1.5%) eyes. Retinal detachment was present in one (0.5%) eye. Detectable optic nerve lesions were present in four eyes; in 1 eye (0.5%) there was optic disc drusen, elevated optic disc was present in 2 (1%) and one eye (0.5%) showed cupping. Other demonstrable findings were posterior staphyloma in one (0.5%) eye. The study concluded that B-scan ultrasonography proves accurate and beneficial in opaque ocular media to detect posterior segment pathologies.[40]

The study conducted by Jamil Ahmed, Fahad Feroz Shaikh, Abdullah Rizwan, Mohammad Feroz Memon to determine the diagnostic use of B-scan in the detection of vitreoretinal pathologies in patients with vitreous opacities concluded that B-scan ultrasound is a very useful diagnostic tool. Out of 73 scans performed, 48 eyes had vitreous hemorrhage, 22 eyesshowed inflammation in vitreous and 3 eyes had asteroid hyalosis. Posterior segment pathologies detected in eyes with vitreous haemorrhage were rhegmatogenous retinal detachment, tractional retinal detachment, peripheral retinal tear, posterior vitreous detachment, intraocular tumour, intraocular foreign body, disciform macular lesion & traumatic scleral rupture. In patients with intraocular inflammation, the diagnoses made were endophthalmitis, dropped nucleus and expulsive choroidal hemorrhage.[41]

A study was conducted by Rai P, Syed Imtiaz Ali Shah, Cheema AM et al in Pakistan to detect and differentiate the nature of various traumatic intraocular pathologies by B-scan ultrasonography. The traumatic ocular findings seen on B-scan were cataract, IOFB, retinal detachment, vitreous hemorrhage, hyphema and combined lenticulo-vitreo-retinal abnormalities. The study concluded that ocular B-scan is a safe and non-invasive technique to detect various traumatic intraocular pathologies and therefore help in the planning of further line of management.[42]

PHYSICS OF ULTRASOUND AND B SCAN

Sound is a vibration that propagates as an audible mechanical wave of pressure and displacement, through a medium such as air or water. Audible sound is in the frequency of 20~20,000 Hz. Ultrasound is an acoustic wave that consists of oscillation of particles within a medium. By definition, ultrasound have frequencies greater than 20 KHz (i.e., 20,000 oscillations/sec), rendering them inaudible to humans. They are therefore longitudinal waves which cause particles to oscillate back and forth and produce a series of compressions and rarefactions.[22]

There are three aspects of sound waves that cause different kinds of sounds to be produced. These are frequency, wavelength, and amplitude.

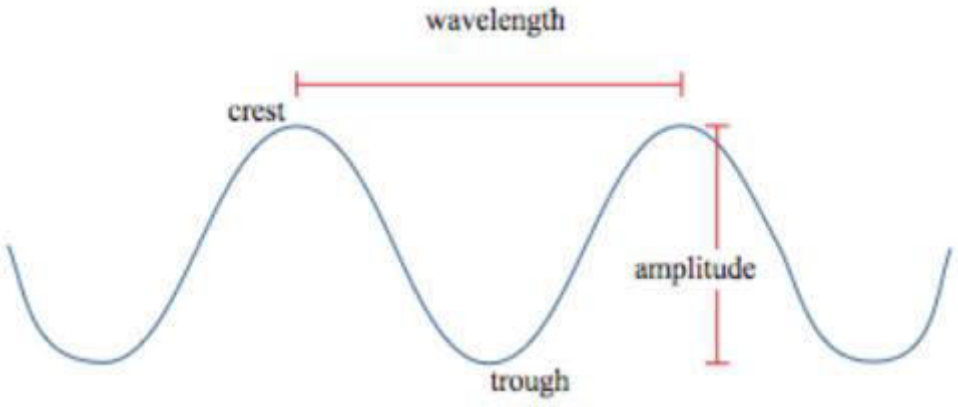


Figure 1 : Features of a Wave

1. **Wavelength (λ):** It represents the length of a complete cycle (the distance between two crests or troughs). It is expressed in mm.

2. **Amplitude:** It is the maximum displacement of an imaginary particle on the wave from the baseline.

3. **Table 1: Velocity of sound in human body tissues**

Substance	**Velocity at 25^{o}C (m/sec)**
Soft tissues	1540
Brain	1541
Liver	1549
Kidney	1561
Blood	1570
Muscle	1585
Lens of eye	1620
Skull bone	4080
Water	1540

4. **Table 2: Velocity of sound in Ocular Media**

Human Tissue	**Velocity (m/sec)**
Cornea	1555
Lens	1641
Aqueous	1532
Vitreous	1532
Sclera	1651
Extraocular muscles	1631
Orbital fat	1462

5. **Frequency:** Frequency is the number of oscillation of the particles in the medium per second as they vibrate about their state of rests. The unit of frequency is cycle per second or Hertz (Hz).
6. **Velocity:** Velocity is the speed of sound propagation It is expressed in meters per second.

Velocity = Wavelength x Frequency

The velocity of an ultrasound wave depends mainly on the medium through which it passes.

Table 3: Velocity of sound in various implant materials

Implant composition	**Velocity (m/sec)**
PMMA	2,720
Silicone	980 1,090
Acrylic	1,900 2,120

When a longitudinal wave produced by ultrasound travels through a tissue, part of the wave gets transmitted, part of it gets reflected back towards the source of the emitted energy, part of it gets refracted, and a part of it may get converted into another form of energy.

Ultrasonography makes use of the reflected sound in comparison with the emitted sound to analyse the acoustic nature of the medium. The nature of the reflected sound depends upon a number of factors.

(i) Acoustic impedance (Z): Acoustic surfaces exist at the junction of two media that have different acoustic impedances. Echoes are produced by these acoustic surfaces. The acoustic impedance of a medium is determined by its sound velocity and density.

Acoustic impedance = sound velocity x density

The greater the difference in the acoustic impedance of the two media that produce the interface, the stronger is the reflected ultrasound wave.[22]

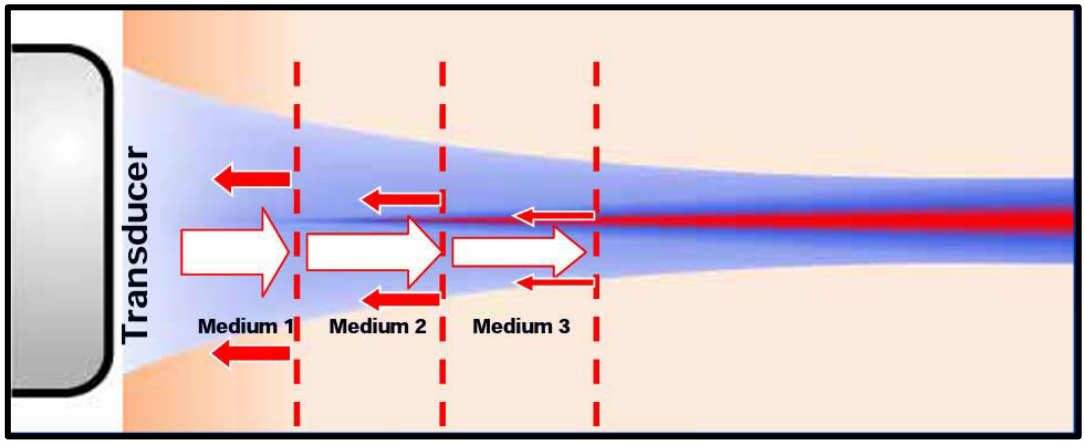


Figure 2: Acoustic impedance

(ii) Angle of Incidence: The angle of incidence is equal to the angle of reflection. When the beam strikes an interface perpendicularly, the echo gets reflected back in the direction of its origin resulting in a stronger echo. If the incident sound beam strikes the interface at an oblique angle, some of the reflected energy is diverted away from the direction from which it originated which results in a weaker echo.[22]

(iii) Resolution: Resolution is the ability to distinguish two structures that are close together as separate. Spatial resolution determines the degree of image clarity. It is influenced by axial and lateral resolution, both of which are closely related to ultrasound frequency. Axial resolution refers to the ability to distinguish two structures that lie along the axis (i.e. parallel) of the ultrasound beam as separate and distinct. Axial resolution is determined by the pulse length. A high frequency wave with a short pulse length will yield better resolution than a low frequency wave

Lateral resolution refers to resolution of objects lying side by side (that is perpendicular to the beam axis). Lateral resolution is directly related to the transducer beam width, which in turn is inversely related to the ultrasound frequency. A high frequency transducer emits a wave with a short wavelength and a small beam width. Lateral resolution is poor when the two structures lying side by side are located within the same beam width.

Frequencies used in diagnostic ophthalmic ultrasound are in the range of 8-10MHz. Being very high frequencies, they produce very short wavelengths (<0.2mm) which allow resolution of minute ocular and orbital structures.[22]

(iv)Acoustic interface: These are positions within the tissue where the values of acoustic impedance change.

The magnitude of difference between the acoustic impedance values of two structures on either side of the interface decides the extent to which the acoustic interface affects a beam of ultrasound incident upon it.

The shape and smoothness of an interface also determine the nature of the returning echo. Echoes displayed from large, smooth interfaces are more dependent

on the direction of the incident sound wave than are those displayed from smaller, coarser interfaces.[22]

(v) Absorption: As ultrasound energy passes through a medium, it is gradually absorbed and converted to heat. But the amount of heat generated is extremely low and has no harmful effects on tissues. Higher frequency sound waves are absorbed to a greater degree than lower frequency sound waves and therefore affect its depth of tissue penetration.

Higher sound velocities and greater tissue thickness result in greater absorption of the sound wave.[22]

(vi) Refraction: Refraction occurs if the two media are of different sound velocities and no refraction occurs when the two media have the same sound velocities.

Refraction can be beneficial or it may be undesirable, producing artifacts. It can be useful in certain circumstances, for e.g., while examining the optic nerve and the extraocular muscles, refraction can bend the sound beam in such a way to strike the surfaces of the nerve or of the extraocular muscle in a relatively perpendicular manner. Also, it is refraction that allows an acoustic lens to focus a sound beam.[22]

(vii) Sound attenuation:It occurs when the sound energy is scattered, reflected, or absorbed by a given medium. It may be more pronounced when the examination is performed through closed lids, extremely dense opacities and membranes, or a medium that produces extremely high reflectivity (e.g., bone, calcium, or foreign material).

It can be evaluated on both B- and A-scan. On A-scan, this spike decrease, called angle kappa, is determined by drawing an imaginary line through the peaks of the lesion spikes and estimating the angle that is then formed with the vitreous baseline. The steeper the angle, the greater is the sound attenuation.

On B-scan, sound attenuation is indicated by a decrease in the brightness of the echoes.[22]

PRODUCTION OF ULTRASOUND

The ultrasound unit basically consists of four components: the pulser, the transducer, the receiver and the display unit.

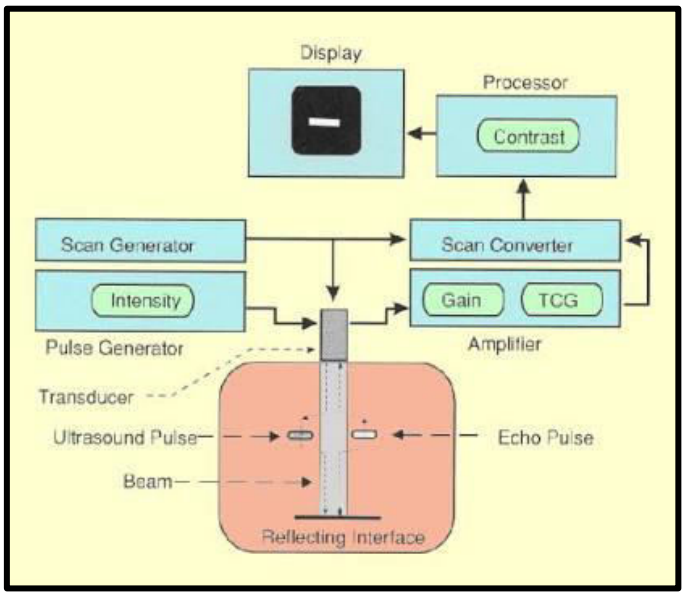


Figure 3: Ultrasound unit components

Pulse-Echo system

Clinical echography depends on emission of an ultrasound wave and the detection and processing of the returning echoes. When multiple short pulses of ultrasound energy with a brief interval between pulses are produced, the technique is

known as pulse echo. Detection, processing and display of the returning echoes occur during this interval.[22]

Probe/Transducer

The main component of the ultrasound transducer is the piezoelectric element. It is typically a quartz or ceramic crystal. The piezoelectric crystal is located near the face of the probe. When stimulated by electrical energy from the instrument, it undergoes mechanical vibration. This vibration causes a longitudinal ultrasound wave to be propagated through the medium. In order to allow the transducer time to receive returning echoes, a pause of several microseconds occurs. As this returning energy strikes the crystal, it creates another mechanical vibration which in turn produces an electrical signal that is transmitted to the receiver and the display screen. This process is repeated a thousand or more times per sec to produce a real time display.

Another component of importance in the ultrasound probe is the damping material. This is attached to the back of the crystal and it usually consists of metal powder mixed with plastic or epoxy which serves to limit the vibrations of the crystal that produce the pulses of ultrasonic energy. As a result, the pulse is shortened. This in addition to the frequency directly relates to the axial resolution of the ultrasound system. Shorter pulses result in better axial resolution.

The sound beam has two zones, the near field and the far field. The near field is the portion of the sound beam located closest to the probe face. The far field is the portion of the sound beam that is located beyond the near field. When the echo source is located within the near field, the resolution of echoes is maximum.[22]

Gain

Gain or sensitivity setting of the instrument allows adjustment of the amplification of the echo signals. It is measured in decibels (dB). The higher the gain level, the greater the ability of the instrument to display weaker echoes. In order to allow greater amplification of more distant, weaker echoes than of stronger echoes originating close to the transducer, many instruments incorporate Time Gain Compensation (TGC).[22]

Signal Processing

The electrical signal produced by the returning echoes is initially received by the ultrasound instrument as a very weak radio frequency signal which then undergoes complex processing that includes amplification, compensation, compression, demodulation and rejection. Of all of these parameters, amplification plays a particularly prominent role.

In ophthalmic ultrasound instruments, one of three different types of amplification is generally used:

- linear
- logarithmic
- S-shaped

The type of amplification used affects the ability of the ultrasound system to display differences in the strengths of various echo signals. This is indicated by the dynamic range. It is the range of echo intensities that can be displayed by the system and is described in units of decibels. A small dynamic range can display minor

differences in echo strength between echo sources, but the range of echo intensities that can be displayed is very limited. Small dynamic range is a characteristic of linear amplifiers. A large dynamic range can display a wide range of echo intensities, but it cannot show slight differences between echo signals. Large dynamic range is a characteristic of logarithmic amplifiers. The S shaped amplification curve developed by Ossoinig is used in some systems to combine the wide range of the logarithmic amplifier and the great sensitivity of the linear amplifier which enhances tissue differentiation.[22]

INSTRUMENTATION AND SETTING

Ever since the introduction of ultrasonic evaluation in medical practice a number of models have been manufactured with constant improvement in the technological efficiency and use.

In our hospital EPIDOT USO machine is used in which both A and B scan can be performed simultaneously.

Standardization:

It refers to calibrating the instrument to obtain echo pattern in conformity with that obtained with other instruments. Standardization is of two types:

- Internal standardization. This is provided by the manufacturer and consists of accurately setting certain parameters that affect signal processing.
- External standardization. This can be performed by the examiner and consists of establishing tissue sensitivity and calibrating the electronic scale. This

standardization is responsible for high reproducibility between different standardized A-scan units.[22]

Tissue Sensitivity

External standardization is performed for each probe/instrument combination with a Tissue Model. This determines the standard decibel setting, referred to as Tissue Sensitivity. Tissue sensitivity is the sensitivity setting of each unit probe combination needed for a standardized examination. It is the setting used for both detection and differentiation of lesions. This is a very high pre-calibrated system that guarantees that even lesions in the vitreous cavity with low reflectivity can be detected.[22]

MODES OF DISPLAY

The echoes received by the transducer after suitable processing in the receiver, demodulator and amplifiers are expressed in one of the several modes of display i.e., A, B, C, D, M scan etc. Of these several modes, A and B-scan are the ones that are routinely used in clinical practice.

1. A Mode: Amplitude modulated display (Time amplitude system)

A-scan echography is a one-dimensional acoustic display. In this mode, echoes are represented as vertical spikes from a baseline. Spacing of the spikes depends on the time required for the sound beam to reach a given interface and for its echo to return to the probe. The time between any two echo spikes is then converted into distance.

Various types of A-scan displays used in ophthalmology include:

- A-scan used primarily for axial length measurements.
- The vector A-scan that can occur simultaneously on a B-scan echogram.

Anaesthetic drops are instilled into the patient's eye indicated for examination. The probe is directly placed on the conjunctiva and shifted between the limbus and the fornix in various meridians.[22] Tissue sensitivity is used for the entire part of the basic examination. For the second part, the examination is repeated with T + 6 dB and T – 20 dB gains.

- Examination at higher system sensitivity such as T + 6 dB will allow detection of any vitreous opacities missed during the examination at tissue sensitivity.
- Examination at lower tissue sensitivity T – 20 dB allows detection of flat fundus lesions and is necessary for measurement of choroidal thickness.

2. B Mode: Brightness modulated scan

B-scan ultrasonography employs 10MHz transducer probes enclosed in a handheld container. A motor within the hand piece moves the ultrasonic probe in a rapid sector scan to create cross-sectional B-scan images. These devices have resolution capacities of approximately 0.4mm axially and 1mm laterally.

Interpretation of a B-scan depends on:

- **Real time**

B-scan ultrasound allows motion of the globe and the vitreous to be easily detected because these images can be visualized at approximately 32 frames/second. Real time ultrasonography can identify tissues such as detached retina or mobile vitreous and also provides information helpful for vitreoretinal surgery.

- **Gray scale**

A variable gray scale format displays returning echoes as a two-dimensional image. Strong echoes are displayed brightly at high instrument gain and remain visible even on reducing the gain. Weaker echoes are seen as lighter shades of gray that disappear on reducing the gain. Comparing echo strengths is the basis for qualitative tissue analysis.

- **Three-Dimensional Analysis**

Developing a mental three-dimensional image is essential, because it provides the vital architectural information that is the basis for B-scan diagnosis and is especially critical in the pre-operative evaluation of complex retinal detachments and intraocular or orbital tumours.[43]

METHODS OF EXAMINATION

Ophthalmic ultrasonography examination techniques are designed to evaluate all aspects of the globe in a methodical, reproducible manner.The specific type of examination performed is determined by the indication for examination.

Basic positioning and patient preparation

Correct positioning of the patient and the ultrasound display monitor significantly helps in the ease of obtaining and evaluating captured images. It is most effective if performed with the patient in the reclined position. The examiner is positioned to the patient's right or left side. The ultrasound display monitor and the patient's head should be parallel and in close proximity to each other to allow for simultaneous viewing of the ultrasound probe position on the eye and the display monitor.[22]

Contact B-scan and diagnostic A-scan are most commonly used to evaluate the posterior globe and orbit. Anterior ocular structures can be evaluated with a modified immersion B-scan examination, but are most commonly evaluated with ultrasound biomicroscopy.

Contact B-scan:

Topical anaesthetic drops are instilled into the eye for examination. A methylcellulose-based gel is used as a coupling agent. The gel is applied to the B-scan's probe tip. The patient is instructed to open both eyes and gaze in the direction being imaged. The probe is placed directly on the eye. It is possible to obtain B-scan images through closed eyelids. However, it is not recommended in most cases due to decreased echo differentiation.[22]

B-scan probe

B-scan probes have a marker along the side of the probe close to the probe tip that indicates the top of the B-scan ultrasound display. Therefore, the top of the B-scan display corresponds to the area indicated on the marker and the bottom of the

display corresponds to the plane 180° away from the marker. The transducer inside the B-scan probe oscillates along the plane of the marker only i.e. towards the marker and away from the marker.

The white line on the far left side of the B-scan display corresponds to the probe tip. The echoes to the right of this line correspond to the ocular structures opposite the probe tip. The further right the ocular structure, the further away is its echo.[22]

B-scan probe positions

Trans-corneal scans

Axial scans

The axial scan is obtained by placing the B-scan probe tip directly over the cornea while the patient looks in primary gaze. The resulting image shows the posterior segment of the globe where the marker tip is at the top of the B-scan display, the crystalline lens and the optic nerve in the center and the portion of the globe 180° degrees from the marker at the bottom of the screen.

The axial scan is the easiest scan to interpret because the lens and the optic nerve are centered in the image. However, significant sound attenuation as a result of passing of the ultrasound beam through the crystalline lens results in a diminished resolution in the B-scan image.

The axial scan can be very helpful in the evaluation of some specific disorders affecting the macula, tenon's space, and the optic nerve.

Axial scans are always obtained with the probe marker facing upward or horizontally.[22]

Para-axial scans

The probe tip is placed directly over the cornea as in the axial scan and the sound beam is shifted slightly to the area of interest in the peripapillary region.[22]

Trans-scleral scans

The two most commonly used scans in ophthalmic ultrasonography are longitudinal and transverse scans. These scans bypass the crystalline lens. Therefore there is decreased attenuation of the ultrasound beam and thus better resolution of ocular structures than the axial scans. In both longitudinal and transverse types of trans-scleral scans the probe tip is placed on the conjunctiva 180° away from the area of interest and the patient's gaze should be directed approximately 30° in the direction of the area to be examined.

In ophthalmic ultrasonography the optic disc is used as the reference center of the posterior segment.[22]

Longitudinal scan

It is obtained by placing the probe marker in the direction of the clock hour to be imaged. The resulting image shows the fundus along a specific clock hour. The fundus anterior to the equator is located at the top of the B-scan display, the fundus posterior to the equator is imaged centrally and the optic nerve is located at the bottom of the display. Therefore, the longitudinal scan shows the anterior to posterior extent of any posterior segment pathology.

Longitudinal scan[22] is the best orientation to evaluate:

- Membranes for insertion into the optic disc or adjacent to the optic disc.
- Localization of small fundus abnormalities such as a retinal tear or a focal tractional retinal detachment
- Evaluation of the macula.

Transverse scan

It is obtained by placing the probe marker perpendicular to the clock hour to be imaged. The resulting image shows a circumferential section through many clock hours with the area of interest in the center of the displayed B-scan.

The transverse scan[22] shows the lateral extent of posterior segment pathology and is essential in:

- Evaluation of retinal detachments
- Evaluation of the circumferential extent of ocular masses.

Immersion B-scan:

In contact B-scan, due to the dead zone in front of the probe, anteriorly situated lesions e.g., lesions of the anterior segment of the eyeballand anterior part of the orbit are not well delineated. And because the area of best resolution is in the center on the right side of an echogram, examining the anterior segment with a standard 10MHz contact probe can be accomplished only with the use of a scleral shell. This shifts the anterior segment to the right and into the area of focus of the sound beam, improving resolution of anterior segment pathology. The shell is filled with a coupling medium e.g., saline, methylcellulose 1% to a meniscus so as to shift

the blind zone towards the probe. The coupling technique is known as 'stand-off'. The probe is placed on top of the shell. This produces an echolucent area on the left side of the echogram corresponding to the shell and methylcellulose, and it shifts the anterior segment to the right side of the display screen.[22]

Once the lesion is detected further examination like topographic examination, quantitative echography and kinetic echography is performed.

Topographic echography

It is performed to determine a lesion's location, general classification and configuration.[22]

Quantitative echography

Quantitative echography is performed to determine the reflectivity, internal structure, and sound attenuation of the lesion.

Quantitative Echography I

Reflectivity is evaluated by observing the spike height on A-scan and the signal brightness on B-scan. There are several different types of intraocular lesions that can be assessed with quantitative echography[22]. These include

- Membranes and bands
- Opacities
- Foreign bodies
- Tumours

Table 4: Reflectivity categories

CATEGORY	SPIKE HEIGHT ON A-SCAN (%)
Extremely low	0-5
Low	5-40
Medium	40-60
Medium-high	60-80
High	80-100

Quantitative echography II

It is applied whenever a membrane like lesion produces a 100% spike at the tissue sensitivity gain setting during quantitative type I assessment, and the other acoustic characteristics are equivocal. It is an A-scan method for the differentiation of a retinal detachment from a posterior vitreous detachment.[22]

The maximum lesion spike is first identified and then a new artificial point of reference is made by raising the horizontal line indicator on the A-scan unit from its normal position below the base line to a point midway up the ordinate line. The system sensitivity is then decreased until the spike just touches the horizontal marker line without exceeding it and this is called “lesion sensitivity”. The system sensitivity is than decreased until the peak of the scleral spike just touches the horizontal marker without exceeding it. This is called “Scleral sensitivity”. The two system sensitivities are read in decibels and their difference is noted.

Kinetic Echography:

Kinetic echography is used to dynamically assess the motion of or within a lesion. Three types of motion can be detected:

- Aftermovement (lesion mobility) is determined by observing motion of the lesion echoes following cessation of eye or body movement. For e.g., vitreous membrane or retinal detachment.

- Vascularity (fast spontaneous motion) represents blood flow within vessels.

- Convection movement (slow spontaneous motion) occurs due to convection currents of fine particles (e.g., cholesterol debris) within a large cavity (e.g., vitreous cavity).

The characters best made out in B-scan are topography, size and lateral extension.

The characters that are best made out in A-scan are acoustic structure, reflectivity, attenuation, vascularity, elevation and exact measurement.[22]

It is only by combining major assets of A and B-scan modalities that a complete and reliable diagnosis is made.

INDICATIONS FOR ULTRASONOGRAPHY IN OCULAR DISEASES

The most valuable use of ocular ultrasonography is for the evaluation of eyes where the media is not clear and hence does not permit fundus visualisation. It is also extremely useful for soft tissue study of orbital disorders.

The principal groups of ocular disorders requiring ultrasonographic examination are:[44]

1. Evaluation of intraocular details obscured from visualisation by ocular media opacities. For e.g., corneal opacities, hyphema, seclusio/occlusio pupillae, cataract, cyclitic membrane etc.

2. In any condition where the vitreous is not clear. For e.g., in vitreous hemorrhage, on echo evaluation one my pick up retinal tear with detachment, disciform degeneration, melanoma, fibrovascular fronds with tractional RD or sub hyaloid hemorrhage. In vitritis/endophthalmitis, it helps in ruling out foreign body and rupture of intraocular cyst and helps in assessing the response to treatment.

3. In intraocular tumoursto localize, to measure, to differentiate the mass and to evaluate growth during follow up studies.

4. The cause of leucocoria whether due to retinoblastoma, PHPV, Coats' disease, retinopathy of prematurity etc.

5. Patient planned for penetrating keratoplasty with opaque anterior segment.

6. In oculo-orbital trauma, to look for intraocular foreign bodies and to assess the extent of intraocular damage.

7. In orbital disordersto detect orbital mass lesions and lesion of extraocular muscles.

8. In optic nerve lesions to look for enlargement of the optic nerve shadow in tumors of the optic nerve etc.

9. Biometry and pachymetry

ULTRASONIC APPEARANCES OF THE NORMAL EYE

In order to detect any abnormality, it is absolutely essential to have a clear understanding of the echogenic pattern of the normal eye.[22]

B-scan examination of a normal globe at high system sensitivity reveals two echogenic areas separated by an echo free area:

- The echogenic area on the left represents reverberations of the tip of the probe and has no clinical significance. The echogenic areas on the right represent the retina, choroid and sclera and the orbital tissues behind it. The proximal surface is concave and represents the retina and the distal surface, which is jagged, represents attenuation of the sound beam within the orbital structures behind the globe.

- The echo free area represents the vitreous cavity (V). The absence of echoes is due to the absence of large interfaces within the vitreous cavity. If echoes arise from within the vitreous cavity, it signifies the presence of an intraocular pathological condition.

- The optic nerve can be seen as a hypoechoic tubular structure extending from the posterior pole of the eyeball toward the orbital apex passing through the retrobulbar fat which is hypoechogenic. The extraocular muscles, especially the medial and lateral recti, can be identified on a horizontal B-scan.

A-scan features:

A normal globe on B-scan examination displays the following echo spikes from left to right

- The initial spike (IS): it represents reverberations generated at the tip of the probe. This spike has no significance.

- The baseline (B): it is a horizontal line which represents the vitreous cavity. In normal conditions, no spikes are noted in this segment because of the homogeneity of the vitreous body and absence of large interfaces. The presence of a spike on the horizontal line signifies the presence of an intraocular pathological condition requiring further evaluation.

- The retinal spike (R): it is a straight high rising echo spike perpendicular to the baseline.

- The choroidal spikes: these are multiple high reflective echo spikes located between the retinal spike (R) and scleral spike (S) which results from the presence of multiple interfaces formed by choroidal vessels.

- The orbital spikes (O): these are multiple echo spikes behind the scleral spike. The initial spikes are highly reflective which decreases rapidly because of sound attenuation in the orbit.

- A retinochoroidal layer thickness of up to 1.0 micro sec. (0.075 mm) is normal. Although the thickness of the retinochoroidal layer varies from the posterior pole to the periphery, a thickness of more than 2 micro seconds (1.5 mm) is considered abnormal.

ULTRASONOGRAPHY IN VITREORETINAL DISORDERS

On B-scan echography the echo intensity, shape, distribution, and mobility of vitreoretinal lesions are observed. Vitreoretinal lesions appear acoustically opaque on B-scan. On A-scan echography, vitreoretinal lesions appear as single or multiple echo spikes within the echo free vitreal baseline.

Vitreous Floaters

A-scan shows lesion spikes that are less than 5% at tissue sensitivity.

B-scan shows point like single small echogenic opacities with high mobility reflected by the presence of distinct aftermovements.[45]

Asteroid Hyalosis

On A-scan, asteroid hyalosis appears as medium to highly reflective spikes. These move with the vitreous.

On B-scan, the asteroid bodies appear as both diffuse and focal point-like highly reflective sources. Present between the posterior border of the asteroid bodies and the retina is an area of clear vitreous.[45]

Vitreous Hemorrhage

Signal intensity on both A- and B-scan directly correlates with the density of the hemorrhage. Diffuse opacities of low to medium reflectivity on B-scan, with multiple low intensity spikes on A-scan represents fresh vitreous hemorrhage. Organisation of blood results in the formation of pseudomembranous surfaces on B-scan, corresponding to slightly higher intensity spikes on A-scan.[45]

Subhyaloid Hemorrhage

B-scan shows a membranous echo in the posterior vitreous, representing posterior vitreous face and multiple point like echoes in the space between it and the retina representing subhyaloid hemorrhage.[45]

Posterior Vitreous Detachment

Ultrasonographically, PVD appears as a thin, smooth membrane that may retain its attachment to the retina at the site of retinal tears, areas of neovascularization, optic disc, and/or at the vitreous base.

A PVD can mimic a RD on ultrasonography when the posterior hyaloid remains attached to the optic disc. The following characteristics can help differentiate a PVD from an RD:

- A PVD demonstrates significant movement and after movement on dynamic B-scan.
- In the absence of dense vitreous hemorrhage, a PVD appears as a low to medium reflective membrane on both A and B-scan, while a retinal detachment is always highly reflective.
- A PVD is visible only at high gain settings whereas the retina is visible at low and high gain settings.[48]

Retinal detachment

Rhegmatogenous retinal detachment

Retinal detachments are highly reflective with a thickened, rope-like appearance and always have optic disc attachment. Retinal detachments can present with variable mobility, but will always be less mobile than vitreous membranes.

On A-scan, the retina demonstrates close to 100% reflectivity.[48]

Tractional retinal detachment

On B-scan, due to the traction placed on the retina, TRDs demonstrate reduced mobility compared to rhegmatogenous retinal detachments.[48]

Exudative retinal detachment

B-scan ultrasonography shows a smooth, convex surface and the absence of rugae and retinal breaks. The sub retinal fluid will "shift" to the most dependent portion as the patient's head position is changed. The B-scan may also pick up choroidal masses or a thickened choroid or sclera depending on the etiology of the exudation.[45]

Total retinal detachment

On B-scan, the open funnel retinal detachment appears as a wavy, rope like membrane of high reflectivity with mild to moderate mobility. A closed funnel or "T-shaped" chronic retinal detachment appears as a thickened, highly reflective membrane with complete loss of mobility.[45]

Choroidal Detachment

Ultrasonography can be used to differentiate between serous CD and hemorrhagic CD. Serous CD can be smooth, dome shaped or even flat, with

echolucent areas beneath the choroid, minimal or absent aftermovement and lack of attachment at the optic disc. A suprachoroidal hemorrhage shows dense suprachoroidal opacities.[45]

ULTRASONOGRAPHY IN INTRAOCULAR TUMORS

B-scan echography

B-scan ultrasound allows a two dimensional analysis of the various morphological characteristics of intraocular masses. The important characters that are studied are location, size, shape and degree of sound attenuation. Due to the phenomenon of sound attenuation the ultrasound beam is weakened as it penetrates the superficial layers of the tumour till it becomes incapable of generating echoes from the deeper layers. For e.g., due to the dense cellularity of a choroidal melanoma, sound attenuation is very strong.Whereas it is minimal or absent in other lesions that simulate a primary melanoma.

A-scan echography:

- Location of mass: A choroidal mass often produces a double peaked anterior surface spike. The first peak represents the anterior surface of the retina and the second represents the anterior surface of the mass. If the retina is detached and separated from the underlying mass by 0.75 mm or more, then two peaks will also separate in to two distinct echo spikes. But if the two surfaces are adherent to each other they will produce one single spike that is dense and thick.

- Consistency of the mass:The anterior surface spike shows no vertical after movements following a ocular movement in the presence of a solid mass.

- Lesion Spikes:The lesion spikes are multiple echo spikes representing the lesion itself. Evaluation of the lesion spikes will determine the acoustic structure, internal reflectivity and vascularity.

RETINOBLASTOMA AND ITS DIFFERENTIAL DIAGNOSIS

The reliability of echogenic information in the differential diagnosis of various benign forms of leucocoria is relatively good. Echography is frequently indicated as a supplementary procedure to evaluate retrolental masses and scrutinize ocular anatomy behind them.

Retinoblastoma

Echographically, retinoblastomas may have a smooth, dome shape, but more typically, they have a very irregular configuration.

The internal reflectivity varies according to the degree of calcification within the lesion. Shadowing of the adjacent sclera and orbit may occur when these deposits are numerous or large.

Internal vascularity may or may not be detected in these lesions. Concomitant retinal detachment is often present.

Retinoblastomas can infiltrate the optic nerve or extend into the orbit which can be difficult to detect with ultrasound because of shadowing from the intraocular calcification. In these situations, CT or MRI are better modalities for the detection of optic nerve or orbital involvement.

Echography is also important for monitoring the size of retinoblastomas following treatment with radiation or other alternative methods of therapy.

The principal differential diagnosis of leucocoria includes persistent hyperplastic primary vitreous, retrolental fibroplasia, cysticercosis, toxocariasis, coats' disease, medulloepithelioma and endophthalmitis.[45]

Table 5: Differential diagnosis of leucocoria[22]

CONDITION	MAIN ECHOGRAPHIC FINDING
Retinopathy of prematurity	Total RD with retinal loops
Persistent hyperplastic primary vitreous	Vitreous bands from lens to optic nerve
Coats' disease	Exudative retinal detachment
Toxocariasis	Retinal folds and posterior TRD
Endophthalmitis	Vitreous opacities
Cysticercosis	Cyst with scolex
Medulloepithelioma	Ciliary body mass with cystic cavities

Malignant melanoma

Ultrasonographic features of uveal melanoma[45]

A-scan

- Low to medium reflectivity
- Sound attenuation
- Fast, spontaneous, low amplitude flicker

B-scan

- Collar button/dome shape
- Solid consistency
- Acoustic quiet zone
- Choroidal excavation
- Intrinsic vascular pulsations

Choroidal Hemangioma

On A-scan, it demonstrates high internal reflectivity with negligible attenuation.

On B-scan, it appears as a dome-shaped hyperechoic choroidal mass with smooth contours. Calcification may be present on the tumour surface.[45]

Metastatic Carcinoma of the Choroid

On A-scan, the internal reflectivity is usually medium to high with minimal or absent internal vascularity.

On B-scan, choroidal metastases display an irregular surface with central excavations. Some choroidal metastases present with atypical features such as low internal reflectivity and internal vascularity and the most common metastasis to produce these atypical findings is small cell carcinoma of the lung.[45]

CHOROIDAL OSTEOMA

A-scan typically shows a sharp high-intensity echo spike from the anterior surface of the tumour and high internal reflectivity.

B-scan demonstrates high reflectivity at the level of the choroid and orbital shadowing due to calcium deposition. "Pseudo-optic nerve" or "double optic nerve" appearance may be seen if the lesion is away from the optic disc.[45]

COLOBOMA OF THE CHOROID AND OPTIC DISC

B-scan can clearly delineate the inferior location of the excavations which are of varying depth. These excavations may be smooth or may have an out pouching. The edges are typically overhanging and sharp or shelved.[45]

ANOPHTHALMOS

Characteristic findings on B-scan ultrasound include an absent or small orbit, an absent globe, and an absent lens.[45]

MICROPHTHALMOS

Nomograms for ocular biometric measurements based on ultrasonography have been developed.Microphthalmia is considered when the ocular diameter is less than the 5th percentile for gestational age.[45]

INTRAOCULAR AIR AND GAS

Sound can penetrate through a gas bubble that completely fills the vitreous cavity. But if the bubble is small enough it can be moved by head position to allow ultrasonographic evaluation of the posterior segment.[45]

SILICONE OIL

There is significant reduction in the penetration of the ultrasound signal in eyes with silicone oil due to the significantly lower velocity of ultrasound in silicone oil than in the vitreous. This limits observation of the posterior ocular wall. This also causes a 50% echographic elongation of the vitreous cavity. Due to these limitations, conventional ophthalmic B-scan is unreliable in the differential diagnosis of intraocular structures in silicone filled globes.

There is usually a small amount of silicone oil remaining in the eye after it is surgical removal which on ultrasonography appear as highly reflective echoes scattered in the vitreous cavity.[45]

ENDOPHTHALMITIS

B-scan ultrasonography shows dense vitreous opacities and moderate to marked, irregular, web-like vitreous membrane formation.

As PVD develops in an eye with endophthalmitis, a TRD like configuration may be seen which is due to the thickened inflamed posterior hyaloid adherent to the retina. Exudative or tractional retinal detachment, choroidal detachment, retinochoroidal thickening and optic nerve head elevation may also be seen. In case of post-traumatic endophthalmitis, an intraocular foreign body may also be present.[45]

ULTRASONOGRAPHY IN OCULAR TRAUMA

Ultrasound has revolutionized the management of the traumatized eye. Detection of abnormalities that cannot be visualized clinically when the cornea, lens or vitreous is opaque has been a limitation of diagnosis in ophthalmology in past and

these kind of circumstances occur frequently in ocular trauma when corneal oedema, hyphema, secondary cataract, or vitreous hemorrhage or debris obscure the observer's view and makes thorough clinical examination impossible.[46]

In such cases, B-scan ocular ultrasonography has been shown to yield valuable diagnostic and prognostic information to define the nature of the pathology and guide management.

Ruptured Globe

The sclera in the area of rupture may show an irregular contour, thickening, and decreased reflectivity on ultrasound.In cases with incarcerated vitreous and/or retina in the scleral rupture, these may produce traction folds or bands that extend across the posterior segment toward the site of incarceration.[45]

Intraocular Foreign Body

Diagnostic ultrasonography is valuable in determining the exact location and orientation of small IOFBs. It is also vital in distinguishing between objects composed of different materials. The following types of IOFBs can be detected by a B-scan:

- Extremely thin IOFBs (<100 μm), such as a metallic wire or a splinter of wood.
- Metallic IOFBs. They are echo dense even at low gain settings and produce shadowing of intraocular structures and the orbit.
- Organic IOFBs. These foreign bodies are usually echo dense at low gains.

- Intraocular sutures, air bubbles, and retained lens fragments can closely resemble true IOFBs. They present as small points of highly reflective echoes with a combination of reverberation echoes and shadowing present.[45]

Dislocated Lens material and Dislocated Intraocular Lens

- The clear lens appears as a globular echolucent structure while a cataractous lens appears highly reflective, and the internal echoes vary depending on the amount of cortical hydration.

- On B-scan, a posteriorly dislocated crystalline lens appears as an oval-shaped, highly reflective mass and in cases with a long standing dislocated lens, it may become calcified and cause dense shadowing.

- A displaced intraocular lens appears as a highly reflective linear body with marked reverberation. There will also be two focal areas of reverberations corresponding to the intraocular lens haptics.[45]

METHODOLOGY

Source of Data:

All patients attending the out patient, in-patient and referrals to Ophthalmology department at KLE'S Dr.PrabhakarKore Hospital and Medical Research Centre, Belgaum

A descriptive study of a sample size of 250 patients fulfilling the mentioned inclusion criteria will be a part of this study. They will be evaluated using a standard USG machine (SONOMED) equipped with a real-time high-frequency probe with the contact method. The probe is placed over the closed eyelid after application of coupling gel. It detects the prevalence of posterior segment pathologies.

STUDY DESIGN:

A CROSS SECTIONAL STUDY(one year study)

STUDY SIZE: Calculated as per the given formula

n= (4*p*q)/ (d*d)

=250

P= 20% q= 100-p%= 80%

d= 5

POWER OF STUDY= 80%

STUDY PERIOD:

One year- 1st January 2015 to 31st December 2015

SELECTION CRITERIA:

Inclusion Criteria:

The study includes

- All patients, of all age groups, having mature cataracts who come to OPD.
- Willingness and sufficient cognitive awareness to comply with procedures.

Exclusion Criteria :

The study will exclude

- All cases suspected to have isolated anterior segmental and orbital lesions.
- Patient with high risk of / with extrusion of intraocular contents.

Statistical Analysis:

Results will be expressed as frequency of occurrence and percentages of various pathologies.

METHODOLOGY:

All the patients coming to OPD with dense cataracts will form the subjects.

Written informed consent will be taken from the subjects.

Data regarding demographic parameters such as name, age, sex, occupation and address will be noted on a predesigned proforma.

Detailed history of following symptoms will be noted :

- H/O Diminution of vision RE/LE
- Duration
- Gradual/Sudden
- Progression/Static
- Distant/Near vision
- Visual improvement with bright light or dim light
- Painful/ Painless
- Diplopia/Polyopia
- Photophobia
- Flashes of light
- Coloured halos
- Floaters
- Watering
- Redness
- Discharge
- Black spots in front of the eye
- H/O Curtain falling in front of the eyes
- H/O Wearing glasses
- H/O Diabetes Mellitus, Hypertension, Asthma.

History is followed by Systemic and Ocular examination that includes

- Vital Signs –
    - Blood Pressure
    - Pulse
    - Respiratory Rate
    - Temperature
- Distant Visual Acuity with Snellen's chart, Intermediate Visual Acuity, Near Visual Acuity
- Ocular examination proper (adnexa, conjunctiva, cornea, anterior chamber, iris, pupil and lens).
- Detailed slit lamp bio microscopy to grade the cataract as:-
    - Cortical Cataract
    - Nuclear Sclerosis
    - Posterior Subcapsular Cataract
- Schiotz tonometry
- Best Corrected Visual Acuity.
- Retinoscopy.
- Ophthalmoscopy through dilated pupil.
- Pre operative keratometry (Manual Bausch and Lomb Keratometer)
- A scan biometry (SRK II Formula)

Routine laboratory investigations included are:

- Routine Hemogram

Fasting blood sugar using glucometer

After all the investigations, the patient will be taken up for b scan if he/she has dense cataracts.

Introduction

Objectives

Review of Literature

Physics Of Ultrasound And B Scan

Methodology

Results

Discussion

Conclusion

Summary

Bibliography

Annexure-I

Annexure-II

Annexure-III

Annexure-IV

Annexure-V

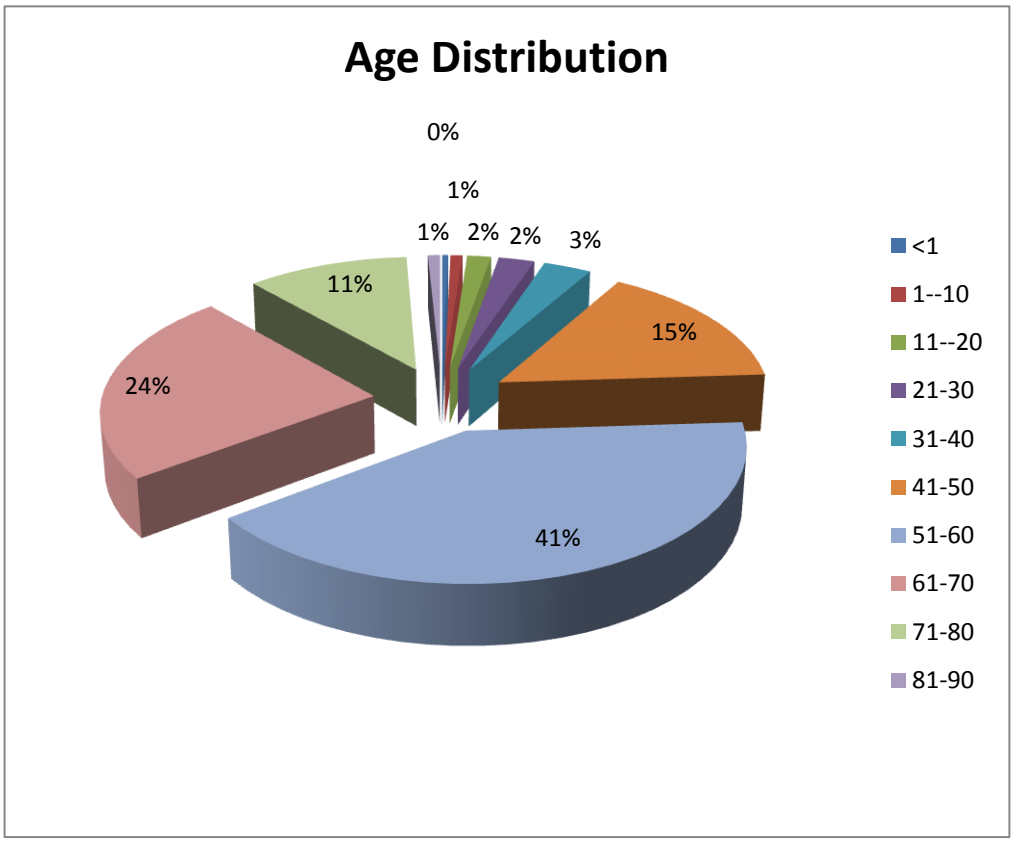
RESULTS AND ANALYSIS

AGE DISTRIBUTION

Table 6: Distribution of patients according to age

Age in years	No: of patients	%
<1	1	0.4
1-10	2	0.8
11-20	4	1.6
21-30	6	2.4
31-40	8	3.2
41-50	39	15.6
51-60	102	40.8
61-70	59	23.6
71-80	27	10.8
81-90	2	0.8
Total	**250**	**100.0**

Graph 1: Distribution of patients according to age



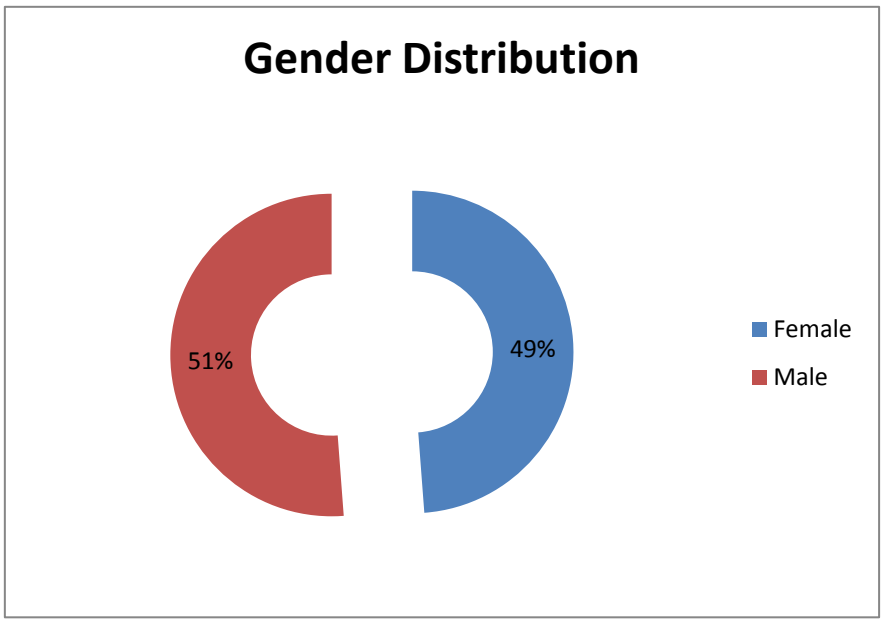
Number of patients in the age group of less than 1 year was 1 (0.4%), in the age group of 1-10 was 2 (0.8%), in the age group of 11-20 was 4 (1.6%), in the age group of 21-30 was 6 (2.4%), in the age group of 31-40 was 8 (3.2%), in the age group of 41-50 was 39 (15.6%), in the age group of 51-60 was 102 (40.8%), in the age group of 61-70 was 59 (23.6%), in the age group of 71-80 was 27 (10.8%), and in the age group of 81-90 was 2 (0.8%).

SEX DISTRIBUTION

Table 7: Distribution of patients according to gender

Gender	No: of patients	%
Female	122	48.8
Male	128	51.2
Total	**250**	**100.0**

Graph 2: Distribution of patients according to gender



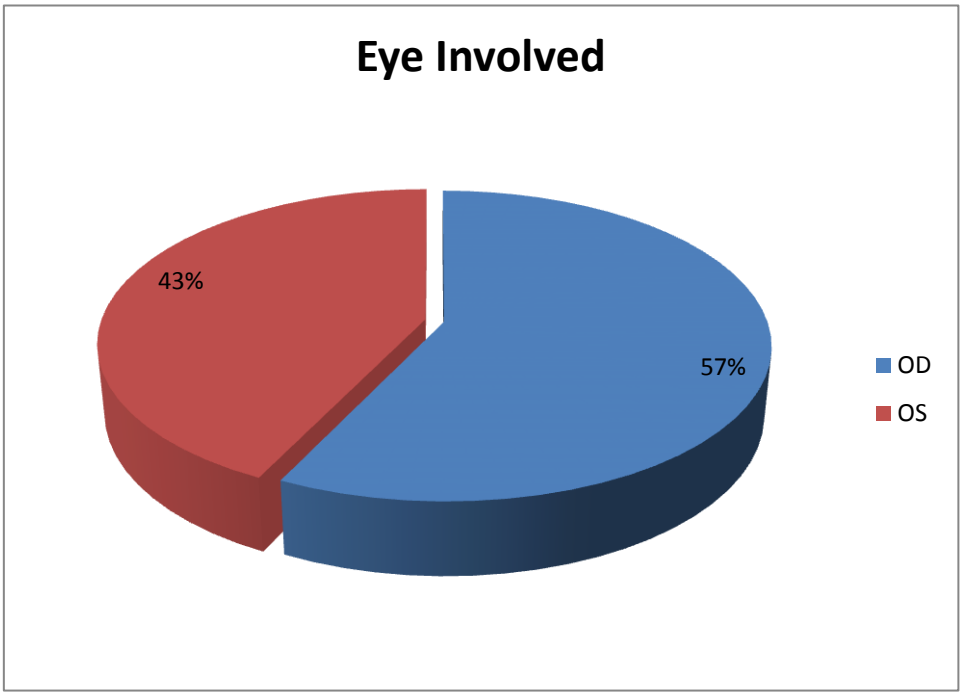
The total number of patients studied was 250. Out of which, 122 were females (48.8%) and 128 were males (51.2%).This shows slight male preponderance.

INVOLVEMENT OF EYE

Table 8: Distribution of patients according to laterality

Eye involved	No: of patients	%
OD	143	57.2
OS	107	42.8
Total	**250**	**100.0**

Graph 3: Distribution of patients according to laterality



Number of patients with right eye involvement was 143 (57.2%) and the number of patients with left eye involvement was 107 (42.8%) which more number of cases with involvement of right eye.

STATUS OF THE LENS

Table 9:Distribution of patients according to the status of the lens

Status of the lens	No: of patients	%
Congenital cataract	3	1.2
Developmental cataract	4	1.6
Brown Cataract	5	2.0
PSMC	11	4.4
Radiation cataract	1	0.4
SMC	221	88.4
SHMC	4	1.6
Blue Dot Cataract	1	0.4
Total	**250**	**100.0**

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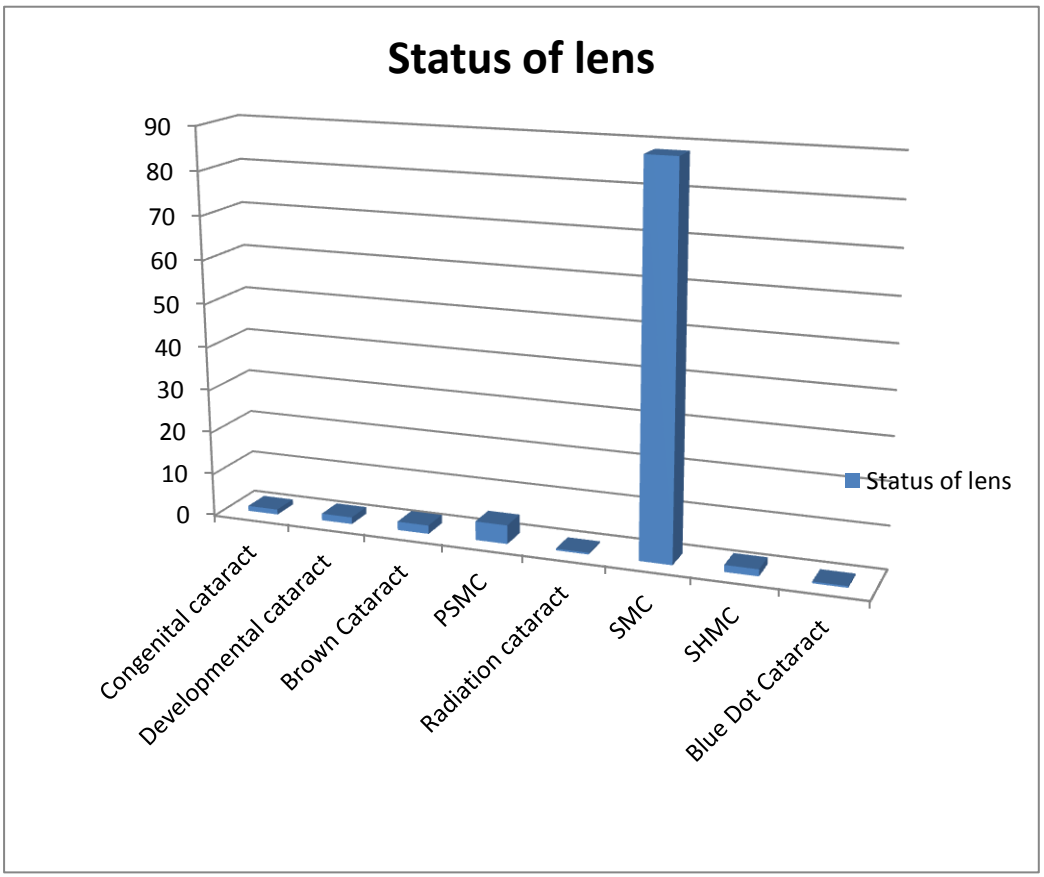
Graph 4: Distribution of patients according to the status of the lens



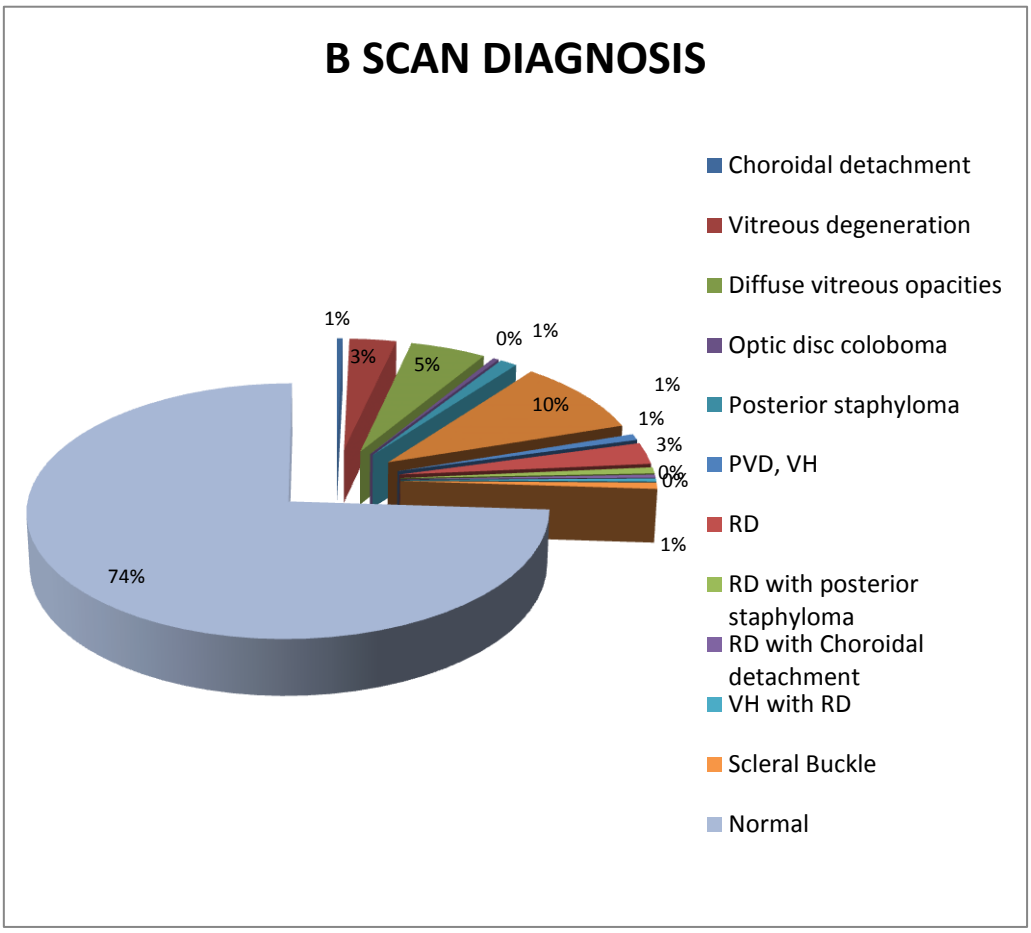
Out of the 250 patients studied, 5 patients (2%) had Brown cataract, 221 patients (88.4%) had senile mature cataract, 4 patients (1.6%) had Developemental Cataract, 1 patient (0.8%) had Radiation cataract and 3 patients (1.2%) presented with congenital cataract. 1 patient (0.4%) had Blue Dot cataract and another 4 patients (1.6%) had senile hypermature cataract. 11 (4.4%) had pre-senile mature cataract. The above graph is ***significant*** as more number of cases are of Senile Mature Cataract

CASE DISTRIBUTION ACCORDING TO BSCAN DIAGNOSIS

Table 10: Distribution of patients according to B-scan diagnosis

B-scan diagnosis	No. of patients	%
Choroidal detachment	1	0.4
Vitreous degeneration	8	3.2
Diffuse vitreous opacities	13	5.2
Optic disc coloboma	1	0.4
Posterior staphyloma	3	1.2
PVD	24	9.6
PVD, VH	2	0.8
RD	7	2.8
RD with posterior staphyloma	2	0.8
RD with Choroidal detachment	1	0.4
VH with RD	1	0.4
Scleral Buckle	2	0.8
Normal	185	74.0
Total	**250**	**100.0**

Graph 5:Distribution of patients according to B-scan diagnosis



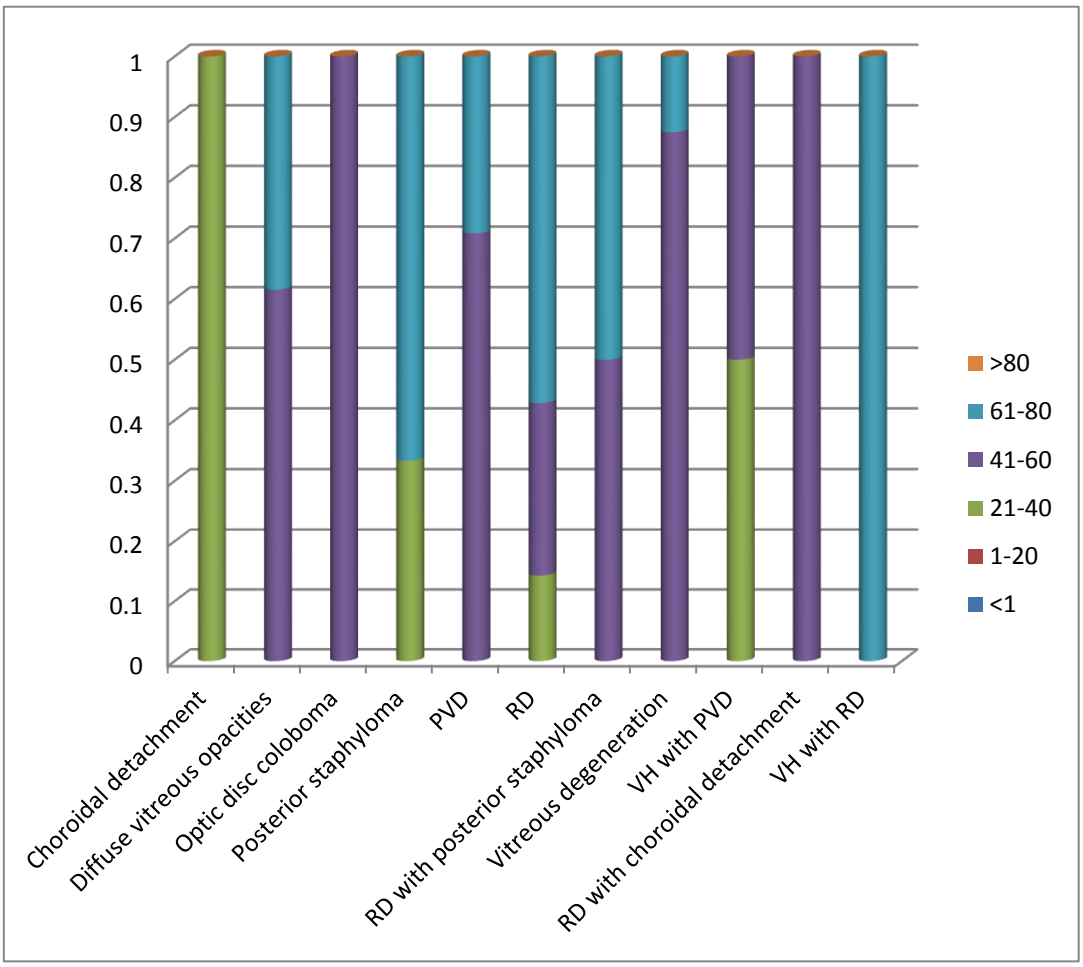
. Out of the 250 patients studied, 11 patients (4%) had retinal detachment, 24 patients (10%) had posterior vitreous detachment, 3 patients (1%) had vitreous hemorrhage, 13 patients (5%) had diffuse vitreous opacities, 8 patients (3%) had vitreous degeneration, 3 patients (1%) had posterior staphyloma, 2 patients (1%) had retinal detachment with posterior staphyloma, 1 patients had vitreous hemorrhage with retinal detachment, 1 patient (0.8%) had subhyaloid hemorrhage, 1 patient (0.4%) had choroidal detachment, 1 patient (1%) had optic disc coloboma, 2 patients had previously implanted scleral buckle.

DIAGNOSIS AS PER AGE

Table 11: B-scan diagnosis according to age

B-scan diagnosis	No. of patients (n=250)		Age in years				
		<1 (n=2)	1-20 (n=16)	21-40 (n=18)	41-60 (n=33)	61-80 (n=28)	>80 (n=3)
Choroidal detachment	1	0	0	1	0	0	0
Diffuse vitreous opacities	13	0	0	0	8	5	0
Optic disc coloboma	1	0	0	0	1	0	0
Posterior staphyloma	3	0	0	1	0	2	0
PVD	24	0	0	0	17	7	0
Retinal detachment	7	0	0	1	2	4	0
RD with posterior staphyloma	2	0	0	0	1	1	0
Vitreous degeneration	8	0	0	0	7	1	0
VH with PVD	2	0	0	1	1	0	0
RD with choroidal detachment	1	0	0	0	1	0	0
VH with RD	1	0	0	0	0	1	0
Scleral Buckle	2					2	
Normal	185						

Graph 6: B-scan diagnosis according to age



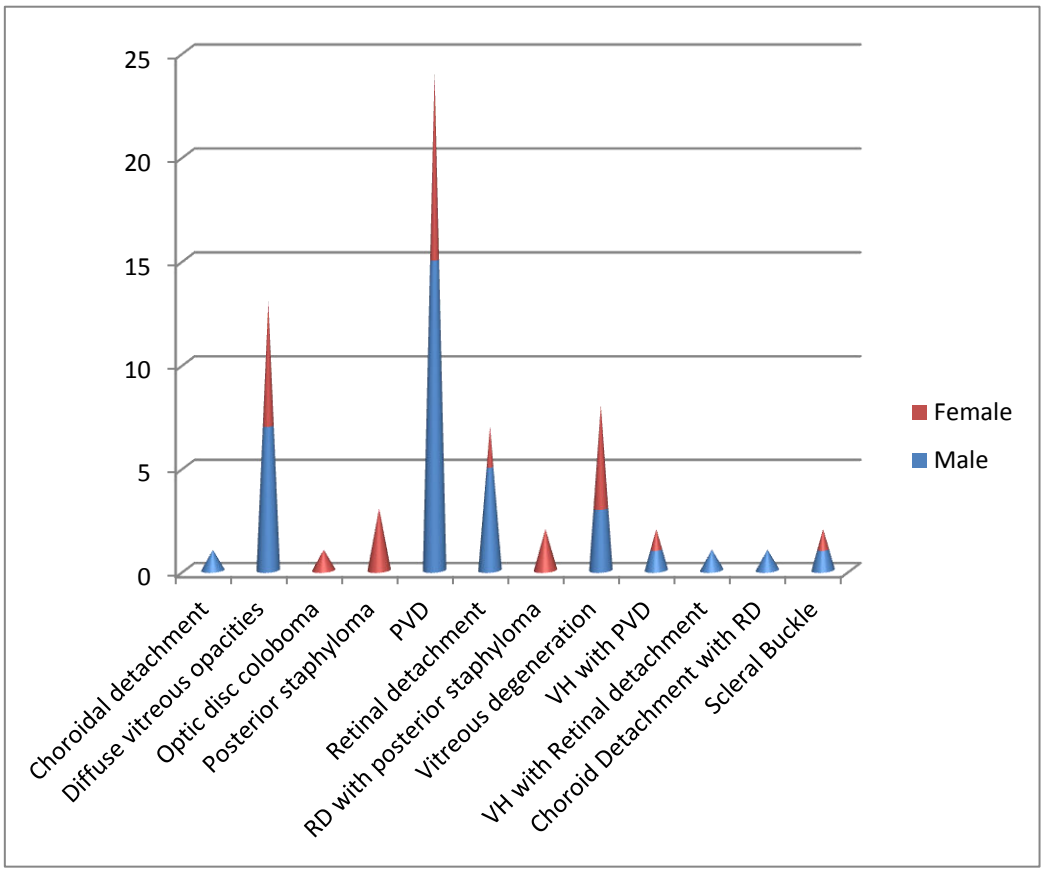
The above graph denotes that more number of positive cases were opberved in the age group 41-60yrs. The highest number of PVD and vitreous opacities were opbserved in the age group 41-60 yrs. Thus the above table is ***significant.***

DIAGNOSIS AS PER GENDER

Table 12: B-scan diagnosis according to gender

B-scan diagnosis	No. of patients (n=250)	Gender	
		Male (n=128)	Female (n=122)
Choroidal detachment	1	1	0
Diffuse vitreous opacities	13	7	6
Optic disc coloboma	1	0	1
Posterior staphyloma	3	0	3
PVD	24	15	9
Retinal detachment	7	5	2
RD with posterior staphyloma	2	0	2
Vitreous degeneration	8	3	5
VH with PVD	2	1	1
VH with Retinal detachment	1	1	0
Choroid Detachment with RD	1	1	0
Scleral Buckle	2	1	1
Normal	185	93	92

Graph 7:B-scan diagnosis according to gender



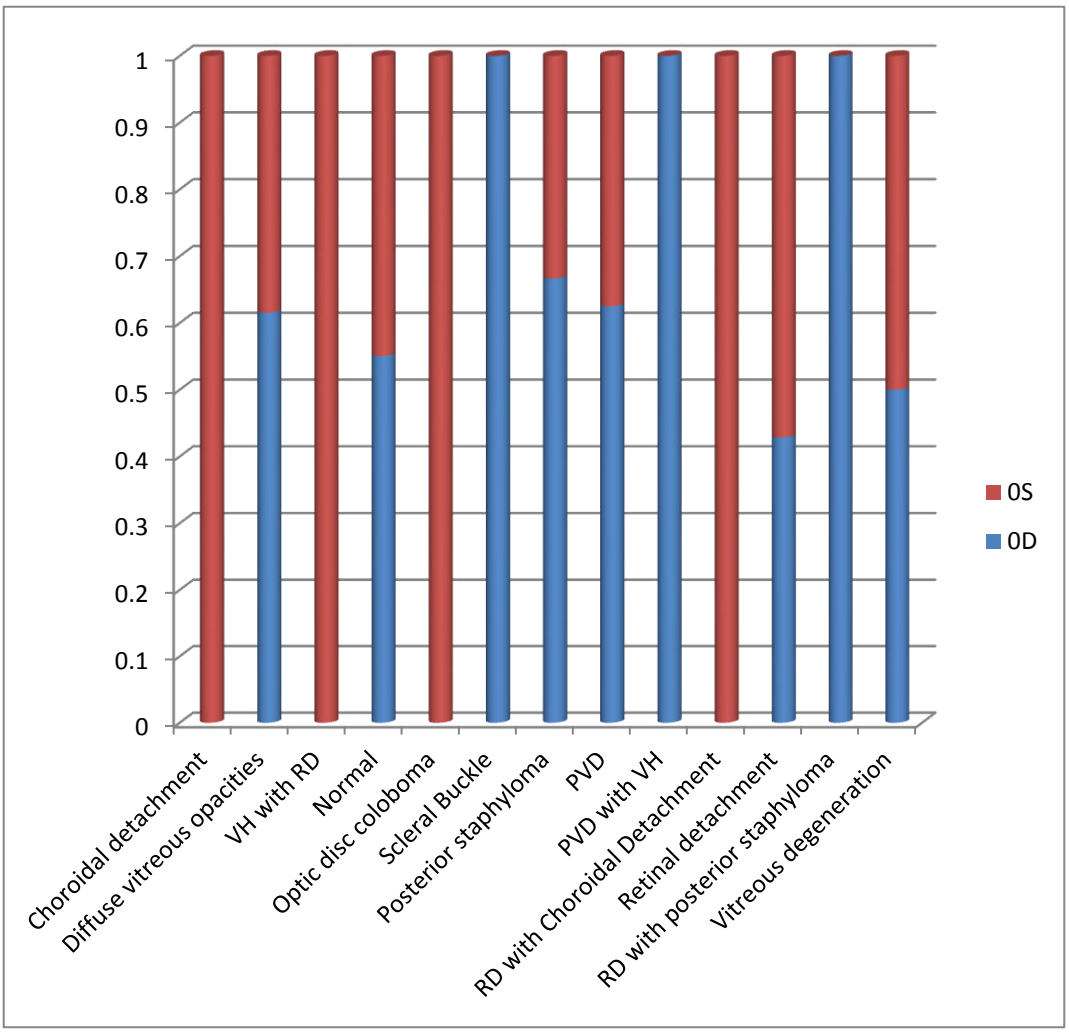
On B scan diagnosis, it was observed that there was slight male preponderance. Therefore the table is significant.

DIAGNOSIS AS PER EYE INVOLVED

Table 13: B-scan diagnosis according to laterality

B-scan diagnosis	No. of patients (n=250)	Eye involved	
		OD (n=143)	OS (n=107)
Choroidal detachment	1	0	1
Diffuse vitreous opacities	13	8	5
VH with RD	1	0	1
Normal	185	98	80
Optic disc coloboma	1	0	1
Scleral Buckle	2	2	0
Posterior staphyloma	3	2	1
PVD	24	15	9
PVD with VH	2	2	0
RD with Choroidal Detachment	1	0	1
Retinal detachment	7	3	4
RD with posterior staphyloma	2	2	0
Vitreous degeneration	8	4	4

Graph 8:B-scan diagnosis according to laterality



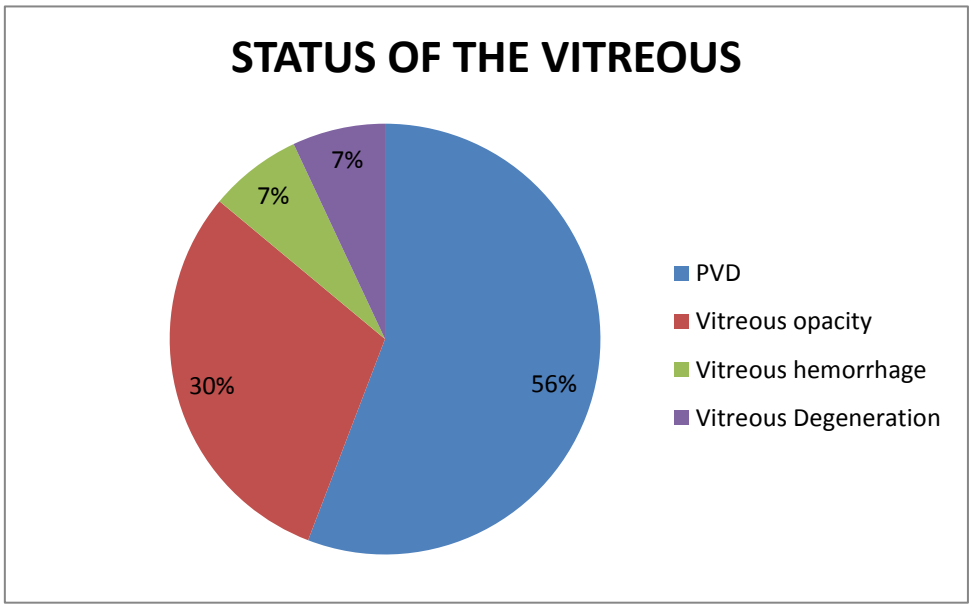
The above graph shows that on Bscan, more number of cases were observed in right eye. Therefore this result **is *significant***.

DIAGNOSIS AS PER VITEROUS

Table 14: Bscan diagnosis according to status of vitreous

Status of the vitreous	No: of patients	%
PVD	24	9.6
Vitreous opacity	13	5.2
Vitreous hemorrhage	3	1.2
Vitreous Degeneration	8	3.2

Graph 9: B scan diagnosis according to status of vitreous



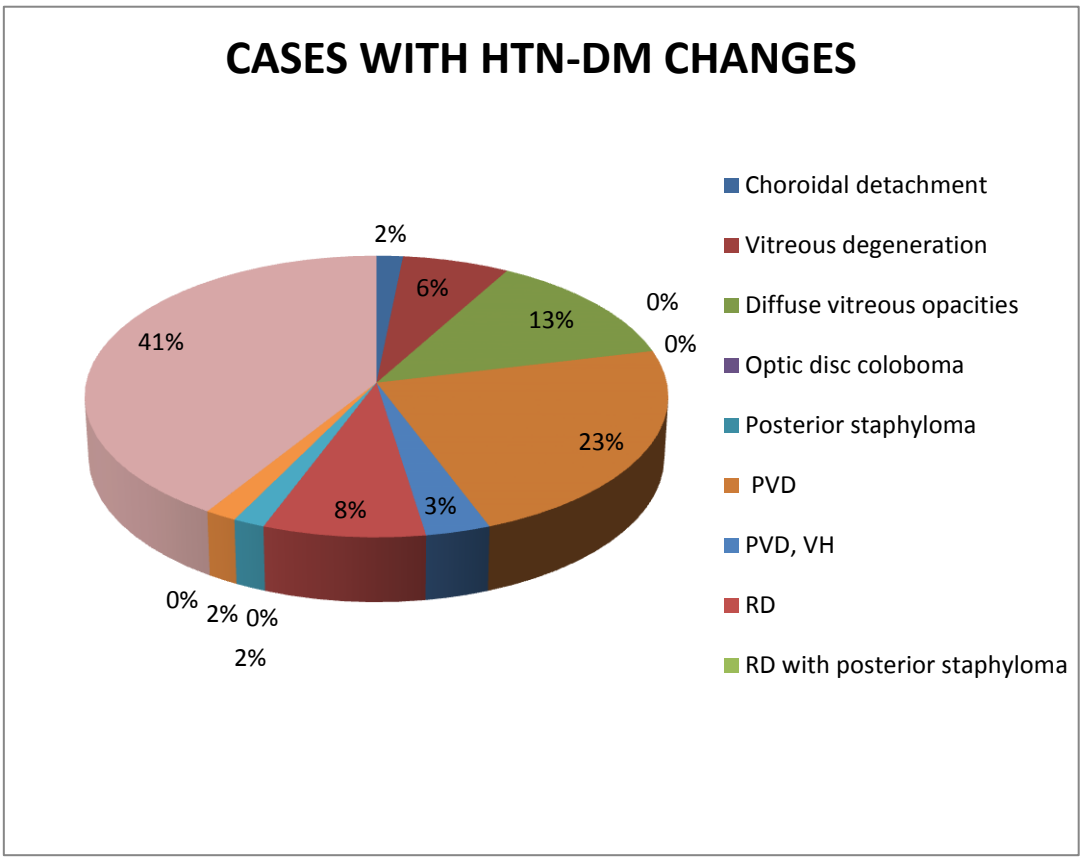
The graph denotes that on Bscan diagnosis, out of the 250 patients studied, 24 patients (9.6%) had Posterior Vitreous Detachment, 3 patients (1.2%) had vitreous haemorrhage, and 13 patients (8.3%) had vitreous opacity and 8 patients(3.2%) had Vitreous degeneration. Therefore this is ***significant.***

DIAGNOSIS AS PER HTN-DM

Table 15:Comparison of Bscan diagnosis with HTN-DM cases

B SCAN DIAGNOSIS	TOTAL	CASES WITH HYPERTENSION/DIABETIC CHANGES	%
Choroidal detachment	1	1	1.6
Vitreous degeneration	8	4	6.5
Diffuse vitreous opacities	13	8	13.1
Optic disc coloboma	1	0	0
Posterior staphyloma	3	0	0
PVD	24	14	22.9
PVD, VH	2	2	3.27
RD	7	5	8.19
RD with posterior staphyloma	2	0	0
RD with Choroidal detachment	1	1	1.6
VH with RD	1	1	1.6
Scleral Buckle	2	0	0
Normal	185	25	40.9
	250	61	100

Graph 10: Distribution of case with HTN-DM changes



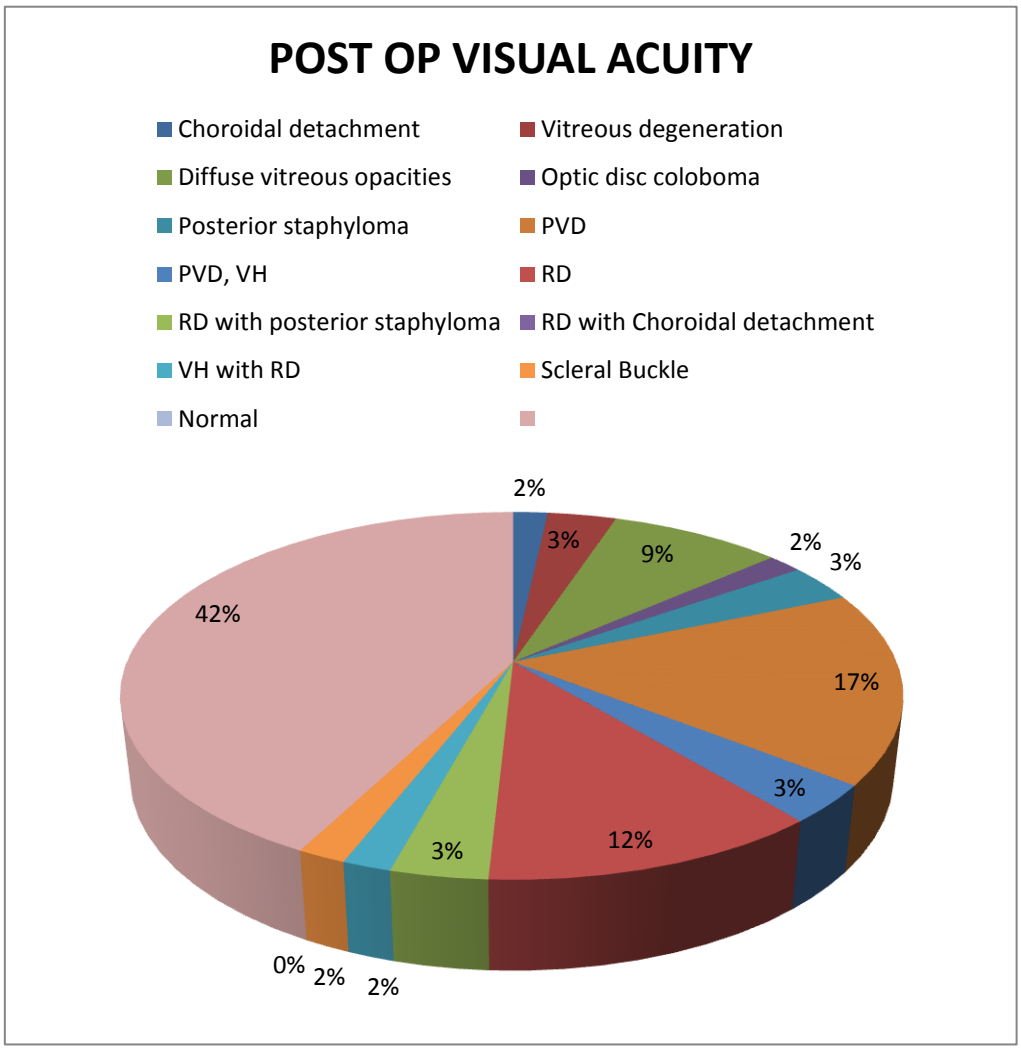
The above graph shows that out of 250 patients, 61 patients had Hypertension-Diabetic changes which comprises of 14 PVD, 8 vitreous opacities, 5 RD, 3 vitreous haemorrhage. Therefore the graph is ***significant***

POST OP VISUAL ACUITY LESS THEN 6/60

Table 16: Cases with post op.vision less than 6/60

B SCAN DIAGNOSIS	TOTAL CASES	CASES WITH POST OP Va LESS THAN 6/60	%
Choroidal detachment	1	1	1.70
Vitreous degeneration	8	2	3.38
Diffuse vitreous opacities	13	5	8.47
Optic disc coloboma	1	1	1.70
Posterior staphyloma	3	2	3.38
PVD	24	10	16.94
PVD, VH	2	2	3.38
RD	7	7	11.86
RD with posterior staphyloma	2	2	3.38
RD with Choroidal detachment	1	1	1.70
VH with RD	1	1	1.70
Scleral Buckle	2	0	0
Normal	185	25	42.37
TOTAL	250	59	100

Graph 11: Distribution of case with Post op visual acuity less than 6/60



The graph shows that out of 250 patients screened in this study. 59 patients had post op visual acuity less than 6/60 comprising of 10 PVD, 5 vitreous opacities, 5 RD and 3Vitreous Haemorrhage.

DISCUSSION

Ultrasonography has established itself as one of our most important diagnostic tools in the clinical practice of ophthalmology, and has increased greatly our ability to detect and differentiate a wide variety of ocular and orbital disorders.[22]

Within the last decade, B-scan screening of opaque ocular media, particularly in eyes with cataract and vitreous hemorrhage, has constituted one of the most common indications for ocular ultrasound examination.[47]

This study presents 250 patients with media opacity who were subjected to B-scan ocular ultrasonography for the detection of posterior segment eye pathology.

CLINICAL BACKGROUND

l cases with opaque ocular media such as dense cataracts, vitreous hemorrhage, inflammatory opacities and retinal changes and a strong suspicion of posterior segment eye pathology were examined.

The age distribution of cases in this study is described in **Table 6**. Highest number of cases was seen in the age group of 51 to 60 years which accounted for 40.8% of cases closely followed by the age group of 61-70 years which accounted for 23.6% of the cases.

The sex wise distribution of cases in this study is described in **Table 7** which shows slight male predominance (51.2%).

The distribution of patients based on the laterality of eye involved has been described in **Table 8**.Right eye was involved in 143 patients as compared to 107 eyes with left eye involvement.

The distribution of patients according to the status of lens is depicted in **Table 9.**Out of the 250 patients studied, 5 patients (2%) had Brown cataract, 221 patients (88.4%) had senile mature cataract, 4 patients (1.6%) had Developemental Cataract, 1 patient (0.8%) had Radiation cataract and 3 patients (1.2%) presented with congenital cataract. 1 patient (0.4%) had Blue Dot cataract and another 4 patients (1.6%) had senile hypermature cataract. 11 (4.4%) had pre-senile mature cataract.

The differential diagnosis as noted on Bscan is shown in **Table 10.** . Out of the 250 patients studied, 11 patients (4%) had retinal detachment, 24 patients (10%) had posterior vitreous detachment, 3 patients (1%) had vitreous hemorrhage, 13 patients (5%) had diffuse vitreous opacities, 8 patients (3%) had vitreous degeneration, 3 patients (1%) had posterior staphyloma, 2 patients (1%) had retinal detachment with posterior staphyloma, 1 patients had vitreous hemorrhage with retinal detachment, 1 patient (0.8%) had subhyaloid hemorrhage, 1 patient (0.4%) had choroidal detachment, 1 patient (1%) had optic disc coloboma, 2 patients had previously implanted scleral buckle.

The Bscan diagnosis according to different age groups is depicted in **Table 11.** On B scan, highest number of PVD was observed in age group 41-60, highest number of RD was observed in 61-70 while highest number of vitreous opacities was noted in age group 41-60.

The age wise distribution of case on B scan diagnosis is shown in **Table 12.** It was found that highest number of PVD was found in males(15), highest number of RD was found in males(7) while highest number of vitreous opacities was found in males(7).

The Bscan according to laterality is shown in **Table 14.**It was observed that more number of cases of PVD and vitreous opacities were found in right eye(15) and (8) while more number of cases of RD was found in left eye. More number of cases were observed in right eye. Therefore this result **is *significant***.

The B scan diagnosis according to status of vitreous is shown in **Table 14.** Out of the 250 patients studied, 24 patients (9.6%) had Posterior Vitreous Detachment, 3 patients (1.2%) had vitreous haemorrhage, and 13 patients (8.3%) had vitreous opacity and 8 patients(3.2%) had Vitreous degeneration. Therefore this is ***significant.***

The distribution of cases on HTN-DM changes is shown in **Table 15.** Out of 250 patients, 61 patients had Hypertension- Diabetic changes which comprises of 14 PVD, 8 vitreous opacities, 5 RD, 3 vitreous haemorrhage. Therefore the graph is ***significant***

The cases with post op visual acuity less than 6/60 is shown in **Table 16.** Out of 250 patients screened in this study. 59 patients had post op visual acuity less than 6/60 comprising of 10 PVD, 5 vitreous opacities, 5 RD and 3Vitreous Haemorrhage

SPECTRUM OF POSTERIOR SEGMENT EYE PATHOLOGY DETECTED:

A sum total of 250 cases with media opacity that were suspected of having posterior segment findings were studied.

Clinical ophthalmic evaluation of the eye included external ocular examination, testing for visual acuity, slit lamp examination, intraocular pressure measurement and fundoscopy. The patients were then examined with B-scan ultrasonography.

In this study, out of 250 cases studied with B-scan ultrasonography, pathological conditions were diagnosed in 65 eyes (26%), whereas 185 eyes (74%) showed normal study.

Common pathologies detected were retinal detachment, vitreous hemorrhage and posterior vitreous detachment.

6 cases were diagnosed to have multiple lesions on B-scan ultrasonography.

RETINAL DETACHMENT

Retinal detachment was the most common pathological condition diagnosed in our study.

Out of 250 cases with opaque ocular media studied with high resolution B-mode ultrasonography, 10 eyes (2%) were diagnosed to have retinal detachment. The main causes were trauma, iridocyclitis, postoperative complication and as a complication of diabetic retinopathy. Isolated retinal detachment was seen in 7 eyes (2.8%), retinal detachment with posterior staphyloma in 2 eyes (0.8%), retinal

detachment with vitreous hemorrhage in 1 patient(0.4%). 1 patient (0.4%) was also diagnosed to have RD, choroidal detachment.

Retinal detachment is an ocular emergency that often requires immediate intervention to prevent rapid, irreversible visual loss.[49-51]

In the preoperative evaluation of retinal detachment, several factors are taken into account,including the nature of the detachment, the localization and extent of the detachment, the presence of retinal holes and tears, and the state of the vitreous. Lack of clarity in the optical media may confuse the issue in direct and indirect ophthalmoscopy. B-scan ultrasonography circumvents this problem.[52]

In the management of retinal detachment where the optical media are obscured for e.g., by corneal nebula, early cataract, or vitreous clouding, B-scan ultrasonography can be of value in deciding the extent and type of surgical intervention. The decision whether or not to drain subretinal fluid at the time of operation may be influenced by the magnitude of the subretinal space as recorded on B-scan.[52]

B-scan ultrasonography in eyes with clouding or opacity of the ocular media uniquely indicates the presence of retinal and vitreous disease. The ultrasonographic study conducted by Coleman DJ and Jack RL[53] evaluated 160 patients with retinal detachments of all types. Forty detachments in this group were non rhegmatogenous, including 25 detachments secondary to ocular tumors. B-scan ultrasonography indicates the location and extent of the retinal detachment, and helps differentiate rhegmatogenous retinal detachments from detachments secondary to solid tumours.

In the study conducted by Jerneld B, Algvere P, Singh G[54], ninety-three diabetics (168 eyes) with opaque ocular media and low visual acuity were examined by ultrasonography (B-scan) . Dense vitreous membranes were found in 112 (67%) eyes, 100 (60%) of which showed posterior membranes. Preretinal or prepapillary proliferationswere demonstrated in 71 (42%) eyes. Fifty-four (32%) eyes had retinal detachments. These were present in 10 (50%) of the 20 amaurotic eyes. The ultrasonic accuracy was checked in 49 eyes at vitrectomy. It was 78% for retinal detachments and 67% for prepapillary and preretinal proliferations. Ultrasonography thus aids to predict the prognosis after vitrectomy.

Another study conducted by DiBernardo C, Blodi BA, Byrne SF[55] showed the ability of standardized echography to correctly diagnose a retinal tear in patients with opaque ocular media due to vitreous hemorrhage. Records were studied of 42 patients with spontaneous vitreous hemorrhage and no ophthalmoscopic view of fundus details. Of these 42 patients, 11 had an echographic diagnosis of probable retinal tear and no retinal detachment. In 10 (91%) of 11 cases, the presence and location of the tears that were diagnosed echographically were confirmed on clinical follow up. The authors found standardized echography to be a reliable tool in identifying retinal breaks.

A sonographic study conducted by Lt Col KK Sen, Lt Col JKS Parihar, Maj Mandeep Saini, Brig RS Moorthy[56] on 164 patients in order to highlight the advantages of ocular ultrasonography in the evaluation of retinal disorders in patients with opaque ocular media. They concluded that the sensitivity and specificity of this modality in detecting ocular pathologieswas extremely high and is of great value to

the eye surgeon for a preoperative assessment of the posterior segment when fundoscopy is not possible due to opaque ocular media from various causes.

POSTERIOR VITREOUS DETACHMENT

In our study, out of the 250 cases studied, PVD accounted for 9.6% (24 cases).Most cases of PVD were age related. 22 cases showed isolated PVD, 2 case (0.8%) showed PVD associated with Vitreous Haemorrhage.

On B-scan most cases showed typical PVD morphology appearing as a smooth, thin, membrane with aftermovements. Some were complete while some cases showed variable attachment posteriorly to the optic nerve head or the retina.

Few cases with traumatic PVD showed a thickened appearance on B-scan and very high reflectivity on A-scan due to layering of blood on the PVD.

A prospective study conducted by Mirshahi A, Hoehn F, Lorenz K and Hattenbach LO[57] evaluated the vitreous status of eyes by B-scan ultrasonography before planned cataract surgery. The preoperative prevalence and postoperative incidence of PVD were determined by ultrasonography. The study included 188 eyes of 188 patients. Preoperatively, 130 eyes (69.1%) had PVD and 58 eyes (30.9%) had no PVD. Postoperatively, 12 eyes (20.7%) developed PVD at 1 week, 18 eyes (31%) at 1 month, and 4 eyes (6.9%) at 1 year. So here B-mode ultrasonography was very accurate in detecting PVD before and after cataract surgery.

In a study done by Kakehashi et al[58], 400 consecutive eyes were examined using biomicroscopy and B-mode ultrasonography and PVD variations were classified as complete PVD with collapse, complete PVD without collapse, partial PVD with thickened posterior vitreous cortex, or partial PVD without thickened

posterior vitreous cortex. In each PVD type, the most frequently seen ocular pathologies were as follows: in complete PVD with collapse (186 eyes), age related changes without vitreoretinal diseases (77 eyes, 41.4%) and high myopia (55 eyes, 29.6%); incomplete PVD without collapse (39 eyes), uveitis (23 eyes, 59.0%) and central retinal vein occlusion (8 eyes, 20.5%); in partial PVD with thickened posterior vitreous cortex (64 eyes), proliferative diabetic retinopathy (30 eyes, 46.9%); and in partial PVD without thickened posterior vitreous cortex (111 eyes), age related changes without vitreoretinal diseases (62 eyes, 55.9%). This PVD categorisation was significantly associated with the prevalence of each vitreoretinal disease.

In a study conducted by McLeod D, Restori M[59], B-scan ultrasound was used to examine 176 eyes of 154 patients referred for ultrasonic evaluation because of severe diabetic eye disease. Vitreous hemorrhage, posterior vitreous detachment, and retinal detachment could be diagnosed by ultrasonic examination with high accuracy.

VITREOUS HEMORRHAGE

In our study, out of 250 eyes that were scanned, 3 cases (1.2%) were detected to have vitreous hemorrhage on B-scan ultrasonography. vitreous hemorrhage with retinal detachment in 1 case (0.4%), vitreous hemorrhage associated with PVD in 2 cases(0.8%)

Vitreous hemorrhage was the cause of opaque ocular media in some of these cases. Most of the cases were of traumatic etiology and few were as a complication of proliferative diabetic retinopathy.

On B-scan, fresh vitreous hemorrhage appeared as diffuse opacities of low to medium reflectivity with multiple low intensity spikes on A-scan. Old vitreous

hemorrhage was seen as varying reflective dot like echoes organized to form membranes.

The incidence of spontaneous vitreous hemorrhage is approximately seven cases per 100 000 of the population. Proliferative diabetic retinopathy, posterior vitreous detachment with or without retinal tear or retinal detachment and ocular trauma are the most common causes of vitreous hemorrhage. The relative prevalence of these and other underlying conditions has varied in previous reports.[60-64] Despite recent improvements in ophthalmologic examination techniques, evaluation of vitreoretinal diseases withvitreous hemorrhage often presents a diagnostic challenge even when using the standard methods of A- and B-scan ultrasound.[65]

R Rabinowitz et al[65] conducted a study in 96 consecutive patients (106 eyes) with dense vitreous hemorrhage to determine the presence and exact distribution of areas of retinal detachment and the presence of posterior vitreous detachment, retinal tear, intraocular foreign body, or choroidal detachment using B-scan ultrasonography. In 37 eyes (35%) the vitreoushemorrhage was because of proliferative diabetic retinopathy and in 33 eyes (31%)because of ocular trauma. The false-positive rate for retinal detachment (retinal detachmentby USG without clinical confirmation) was 18.9% (seven of 37 eyes). Retinal tears werediagnosed and localized accurately in only four of nine eyes (44%). The study concluded that USG is an effective diagnostic tool in patients with vitreous hemorrhage.

B-scan ultrasound is a very useful diagnostic tool in detection and evaluation of vitreoretinal pathologies in patients with opacities in the vitreous cavity. Out of 73 scans performed by Jamil Ahmed et al[41], 48 eyes had vitreous hemorrhage, 22 eyes showed inflammation in the vitreous and 3 eyes had asteroid hyalosis. Posterior

segment pathologies detected in eyes with vitreous hemorrhage were rhegmatogenous retinal detachment, tractional retinal detachment, peripheral retinal tear, posterior vitreous detachment, intraocular tumour, intraocular foreign body, disciform macular lesion & traumatic scleral rupture. In patients with intraocular inflammation, the diagnoses made were endophthalmitis, dropped nucleus and expulsive choroidal hemorrhage.

DIFFUSE VITREOUS OPACITIES

A study was conducted on 30 patients by Huang J et al[66] to assess the diagnostic value of B-scan ultrasonography in endophthalmitis by comparing results of B-scan ultrasonography and findings in pars plana vitrectomy. On evaluation, the sensitivity of ultrasound was 90-100% and the specificity was 79-100%. Comparison of the results of B-scan ultrasonography and the findings of pars plana vitrectomy showed that B-scan ultrasound is extremely helpful in the evaluation of endophthalmitis and is also helpful in the selection of treatment and planning the time of surgery.

On B-mode USG; low reflective dot like vitreous echoes with thickening of retinochoroidal layer were seen suggestive of vitreous inflammation.

B-scan ultrasonography is useful to determine the severity and extent of inflammation in clinically suspected cases of endophthalmitis. B-scan may help to differentiate whether the vitreous opacities are secondary to inflammation or to vitreous hemorrhage especially when the presence of infection is questionable on clinical examination.[41]

In cases of severe posterior uveitis, diffuse inflammatory infiltrates in the vitreous often preclude evaluation of the posterior segment of the eye.[67]

VITREOUS FLOATERS

Vitreous floaters are produced due to liquefaction of the vitreous gel which could be secondary to vitreous degeneration. These are not considered pathological until they produce visual disturbances. These are commonly seen in old age and myopia.

In the present study, 8 patients (3.2%) were diagnosed to have vitreous degeneration on B-scan ultrasonography. These were seen as scattered low intensity echoes which were uniformly distributed in the vitreous cavity.

POSTERIOR STAPHYLOMA

The possibility of a posterior staphyloma should be considered in all eyes with high axial myopia, especially when it is difficult to measure and is greater than 26 mm. The retinal peak is difficult to capture during the A-scan measurement because the macula may lie on a slope. B-scan ultrasound is used to confirm the unusual shape of the posterior ocular wall.

In our study, 5 cases (2%) were diagnosed with posterior staphyloma. The main etiology in all these cases was myopia. Out of these 5 cases, 2 cases (0.8%) were associated with retinal detachment.

CHOROIDAL DETACHMENT

The suprachoroidal space is normally virtual because the choroid is in close apposition to the sclera.[80] Choroidal detachment occurs when serous fluid, blood or

inflammatory debris accumulates in the suprachoroidal space. Choroidal detachments usually occur in peripheral aspects of the eye, but they may extend to the posterior pole. Peripheral choroidal detachments usually also involve the ciliary body (ciliochoroidal detachments). They can be associated with a number of conditions and can develop following surgery or trauma.[22]Serous choroidal detachment involves transudation of serum into the suprachoroidal space. Hemorrhagic choroidal detachment is a hemorrhage in the suprachoroidal space or within the choroid caused by the rupture of choroidal vessels.[80]

A choroidal detachment typically presents as a smooth, thick, dome-shaped membrane on B-scan and as a thick, steeply rising, 100% high spike on A-scan. The accumulation of hemorrhage and/or cellular debris in the suprachoroidal space produces echoes in this region.[22]

In our study, out of 250 cases studied, 2 cases (0.8%) were detected to have choroidal detachment by high resolution B-scan ultrasonography. Of these, two was associated with retinal detachment as well.

On B-mode USG, choroidal detachment was seen as smooth, thick, dome shaped membrane in the periphery which did not extend beyond the equator and did not exhibit after movements.

OPTIC DISC COLOBOMA

Colobomatous optic disc anomalies including optic disc colobomas and morning glory syndrome, are uncommon, and sometimes associated with retinal detachment and/or retinoschisis. Coloboma of the optic disc appears as a white bowl-shaped excavation that is decentered inferiorly in an enlarged optic disc. The area of

the optic disc is usually enlarged. They result from incomplete or abnormal closure of the embryonic optic fissure.[81]

The condition can present in association with multiple congenital abnormalities indicative of an insult to the developing foetus during the sixth week of gestation. Unilateral and bilateral optic disc colobomata occur with similar frequencies. The coloboma occupies the lower part of the optic nerve head. The neuro-retinal rim is absent inferiorly but is usually identifiable superiorly. In cases in which the adjacent inferior retina and choroid are deficient, microphthalmia may also be evident.[45]

Visual acuity is variably affected, depending upon the extent of the lesion. The ocular abnormalities usually associated with colobomas are retinal detachment which may be rhegmatogenous or non-rhegmatogenous.[53]

In our study of 250 cases, 1 case (0.4%) was diagnosed to have optic disc coloboma.

CONCLUSION

B-scan ultrasound is a simple, safe, non-invasive, cost-effective, easily available, reproducible and quick investigative technique which proves accurate and beneficial in opaque ocular media to detect posterior segment pathologies.

It is advisable to all patients who present with opaque ocular media as a screening device for ocular pathology which will facilitate early diagnosis and management of diseases like retinal detachment and intraocular tumours.

With understanding of the indications for ultrasonography and proper examination techniques, one can gather a vast amount of information not possible with clinical examination alone.

SUMMARY

Ophthalmic ultrasonography is one of the most useful diagnostic techniques for intraocular and orbital evaluation, especially in the setting of opaque media.

It involves pulse-echo technology where high frequency sound waves are emitted from a handheld transducer probe and the returning echoes are processed and displayed on video monitors.

A sum total of 250 cases with media opacity that were suspected of having posterior segment findings were examined with B-scan ultrasonography.

Highest number of cases was seen in the age group of 51-60 years (41%). Out of the total 250, 48.8% were females and 51.2% were males. Right eye was involved in 57% as compared to 43% eyes with left eye involvement.

The patients in this study had commonest clinical presentation as diminution of vision

The diagnosis of posterior segment lesions of the eye were made after studying the morphology and location of the lesion, echo pattern, acoustic characteristics, and kinetics of the lesion during eye movement. These findings were co-related with the age of the patient, history, findings on clinical examination and other investigational modalities.

Common posterior segment pathologies detected by B-scan ultrasonography in descending order of frequency posterior vitreous detachment, diffuse vitreous opacities, vitreous degeneration, retinal detachment, posterior staphyloma and others.

Retinal detachment was observed in ***eleven*** cases with male preponderance mainly in the age group of 61-80 years. The main causes were iridocyclitis, postoperative complication and as a complication of proliferative diabetic retinopathy.

Posterior vitreous detachment accounted for ***twenty four*** cases with male preponderance mainly in the age group of 41-60 years.Most cases of PVD were age related.

Three cases were found to have vitreous hemorrhage on B-scan ultrasonography with male preponderance mainly in the age group of 61-80 years. Vitreous hemorrhage was the cause of opaque ocular media in some of these cases. Most of the cases were as a complication of proliferative diabetic retinopathy.

Thirteen cases were found to have diffuse vitreous opacities on B-scan ultrasonography. Among these, ***two*** cases were diagnosed with endophthalmitis. One case was associated with extensive PVD. The other ***ten*** cases with diffuse vitreous opacities presented with severe posterior uveitis.

Eight cases were diagnosed to have vitreous degeneration on B-scan examination. The main etiology in these cases were myopia and old age.

Five cases were diagnosed with posterior staphyloma. The main etiology in all these cases was myopia. ***two*** cases were also found to be associated with retinal detachment.

Two cases were found to have a sclera buckle on B-scan ultrasonography. They were previously operated for retinal detachment.

Two cases were found to have choroidal detachment by high resolution B-scan ultrasonography.

One case was diagnosed to have optic disc coloboma on B-scan. It was also associated with posterior vitreous detachment and vitreous hemorrhage.

Contact B-scan ultrasound provides a convenient, non-invasive means for the evaluation of intraocular structures in situations where clinical examination is not possible because of opaque ocular media. It also allows a dynamic examination of the vitreoretinal relationship.

Ultrasound studies should be used in conjunction with detailed clinical examination and other investigational modalities.

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ANNEXURE-I

CONSENT FORM

CONSENT FOR PARTICIPATION IN RESEARCH STUDY

ID NO. | | | |

Mr/Mrs/Ms_____ You are invited to participate in our research study titled **"**EVALUATION OF POSTERIOR SEGMENT IN MATURE CATARACTS BY B SCAN BY CROSS-SECTIONAL STUDY" at KLES Hospital, Belgaum."Conducted

Respected Sir/Madam we request you to enroll yourself to participate in our study as you are eligible for doing so.Your participation in the study is voluntary. Your decision whether or not to participate in the study will not affect your relationship with J.N. Medical College. If u decide to participate you are free to withdraw at any time.

Purpose of the study :-The purpose of the research is to know the role of B scan ultrasound in diagnosing prevalence of posterior segment pathologies preoperatively in cases of dense cataracts.

Procedure Involved :-If you agree to enroll yourself in this study, you will be asked to give detailed history. Then you will be clinically examined in detail by slit-lamp examination, direct fundoscopy,lacrimal sac patency test, intra ocular pressure

monitoring, random blood sugar level checking, blood pressure checking will be done. Then you will be undergoing B scan ultrasound procedure.

Risks and Benefits :-.This study doesn't contain any complications. It is beneficial in the way that even if there is dense cataract, posterior segment pathologies can be made out and treated accordingly.

Your participation may benefit you and others and others suffering fromsame ailment in future, by helping us learn more about the disease process and better treatment modalities.

Alternatives :- If you are not willing to participate you will be treated according to the existing protocol & it will not affect your relationship with this hospital.

Costs for participating in this research :-There will not be any extra cost incurred by the participant. The participant will however have to pay for the investigations which are the part of the existing management protocol for this ailment. There is no commitment for any reimbursement or any other compensation for the participant.

Privacy and Confidentiality:-The only people to know that you are a research subject are members of the research team. No information about you or information provided by you during the research will be disclosed to others without your written permission.

Authorization to Publish Results :-When the results of the research are published or discussed, in a conference, no information will be displayed that would disclose your identity. Any information that is obtained in connection with this study and that can be identified with you will remain confidential.

Compensation :- In the event of injury related to the study, treatment will be made available through KLES Dr. PrabhakarKore Hospital & MRC, Belgaum. There is no compensation or payment for such medical treatment by law. The doctors and the staff will provide facilities and medical attention to you.

Questions :- If you have any questions about the research you may please contact:

1. Dr. GANGA S. PILLAI,CHAIRPERSON, JNMC, Belgaum and chairman of Institutional Ethics Committee. Contact No. 08312471350

Consent for participation in research trial

I, Mr./Ms./Mrs _____ voluntarily agree for the participation as a subject of study. By signing this consent form I am not giving up ant of my legal rights, I may withdraw from the study anytime. I am signing the consent form after having read or been read for me in vernacular language, including the risks and the benefits and having all my questions answered.

Subject Name: _____

Signature or the Left Thumb Print of Subject: _____

Witness Name: _____

Signature of Witness: _____

Investigators Name: _____

Signature of Investigator: _____

Name of the

Signature of the guide :- _____

Date: _____: _____

ANNEXURE-II

PROFORMA

OP NO
IP NO
DATE

1. PATIENTS DATA:

NAME:
AGE: SEX:
ADDRESS:
CONTACT NUMBER :-
DATE OF ADMISSION: / /
DATE OF DISCHARGE: / /
IS THE PATIENT ELIGIBLE FOR STUDY?
HAS INFORMED CONSENT BEEN GIVEN?

2. CHIEF COMPLAINTS:

DIMINUTION OF VISION RE LE

Duration:

3.HISTORY OF PRESENT ILLNESS:

1.DIMINUTION OF VISION
DURATION:
1- Progressive; 2- Static
1- Painless;2- Painful
1- For distance; 2- For near
2. DIPLOPIA/POLYOPIA
3. COLOURED HALOS
4.BLACK SPOTS BEFORE THE EYES
5. H/O WEARING GLASSES
Duration:
6. ANY H/O REDNESS, WATERING AND DISCHARGE

3. PAST HISTORY:

TRAUMA TO THE EYE:
OCULAR SURGERY:
Type of surgery: _____
Duration:

4. SYSTEMIC EXAMINATION:

DIABETES:
HYPERTENSION:
ANY OTHER CHRONIC DISEASE

5. PERSONAL HISTORY

SMOKING:
ALCOHOLISM:
ANY OTHER ADDICTIONS:

6. GENERAL PHYSICAL EXAMINATION:

1- Well built ,2- Moderately built, 3- Poorly built

B.P- R.R PULSE-

7. OCULAR EXAMINATION:

A) OCULAR POSTURE
Head posture:
Visual Axis:
Facial Symmetry:
Ocular posture
B) Visual Acuity:

	RE	LE
DISTANT		
PINHOLE		
NEAR		
AIDED		

C) ADNEXA: RE LE

a) EYELIDS/EYELASHES
b) CONJUNCTIVA
c) LACRIMAL SAC

D) ANTERIOR SEGMENT

1)CORNEA

2) ANTERIOR CHAMBER

3)PUPIL:

- Size-
- Shape

REACTION: Direct
Indirect
Position

4)IRIS

E) SCLERA

F) LENS RE LE

Cataract - (1) , PCIOL - (2)
Cataract if present-

A) CORTICAL-
B) NUCLEAR SCLEROSIS:
GRADE-

G) POSTERIOR SEGMENT:

1. VITREOUS
2. RETINA
3. CHOROID
4. MACULA

H) FUNDOSCOPY: RE LE

GLOW
MEDIA
DISC
C:D
BLOOD VESSELS

I)INVESTIGATIONS:

1. Ocular
   A) Lacrimal patency
      RE
      LE
   B) IOP
      RE: mm of hg
      LE : mm of hg

A-scan findings:

$K_{1=}$

$K_{2=}$
AxL=
Ac avg
PCIOL-

J) SPECIAL INVESTIGATION:

- **B-SCAN ULTRASONOGRAPHY FINDINGS:**

1)RIGHT EYE:
-No evidence of vitreous opacities or bands.
-No evidence of retinal or choroidal detachment.
-Retrobulbar space appears normal.
-Optic nerve shadow appears normal.
-There is seen thickening of anterior and posterior capsule of lens suggestive of cataractous changes.

2) LEFT EYE:
-No evidence of vitreous opacities or bands.
-No evidence of retinal or choroidal detachment.
-Retrobulbar space appears normal.
-Optic nerve shadow appears normal.
-There is seen thickening of anterior and posterior capsule of lens suggestive of cataractous changes.

DIAGNOSIS:

OPERATIVE FINDINGS:
Type of surgery:
Intraoperative findings:

Post operative findings:

ANNEXURE III – PHOTOGRAPHS

SAMPLE CASE REPORTS

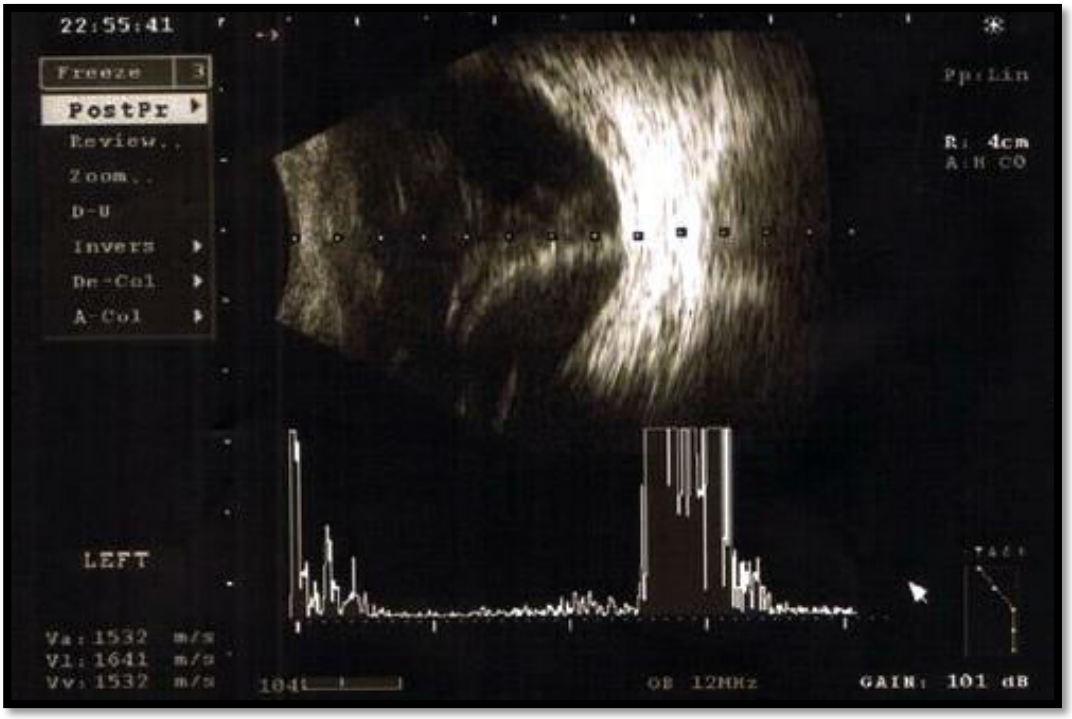
CASE 1

CAUSE FOR NON-VISUALISATION OF FUNDUS:

LE – Senile Mature Cataract with Type 2 DM

B-SCAN DIAGNOSIS:

LE – Transverse B-scan showing a bright continuous membrane suggestive of **peripheral retinal detachment** with diffuse vitreous dot like opacities suggestive of **vitreous hemorrhage**.



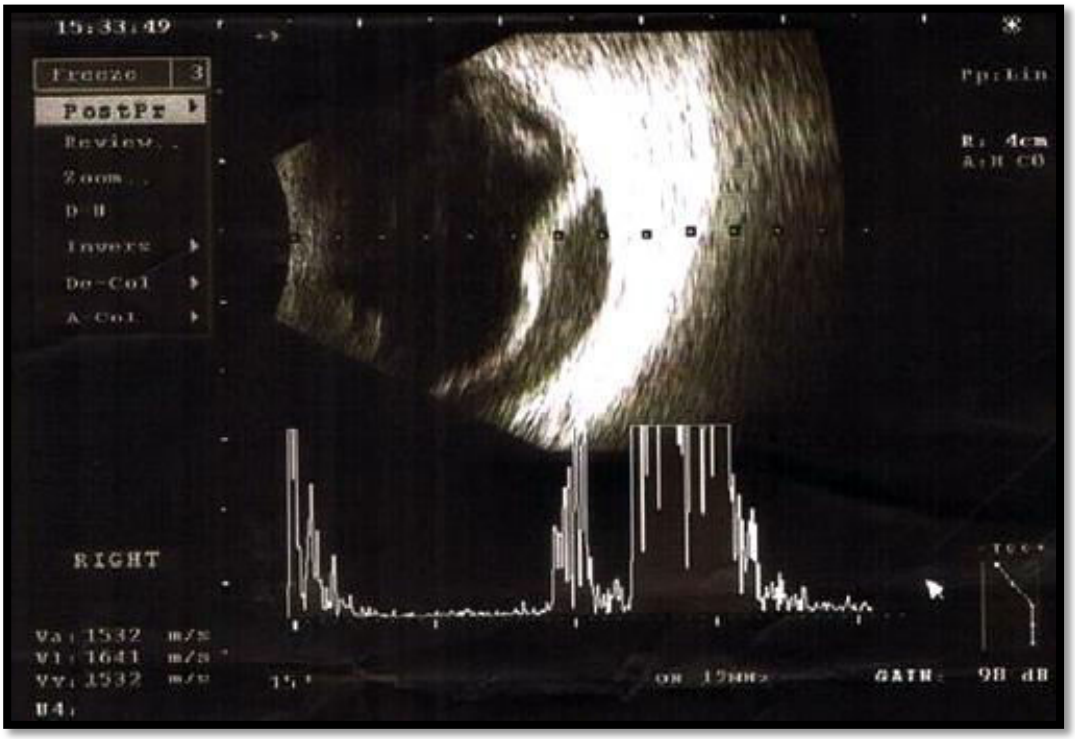
CASE 2

CAUSE FOR NON-VISUALISATION OF FUNDUS:

RE– Senile Mature Cataract with hypotony

B-SCAN DIAGNOSIS:

RE – Transverse B-scan showing dome shaped elevation suggestive of **choroidal effusion** along with few white dot like opacities in the anterior vitreous suggestive of **vitreous hemorrhage**.



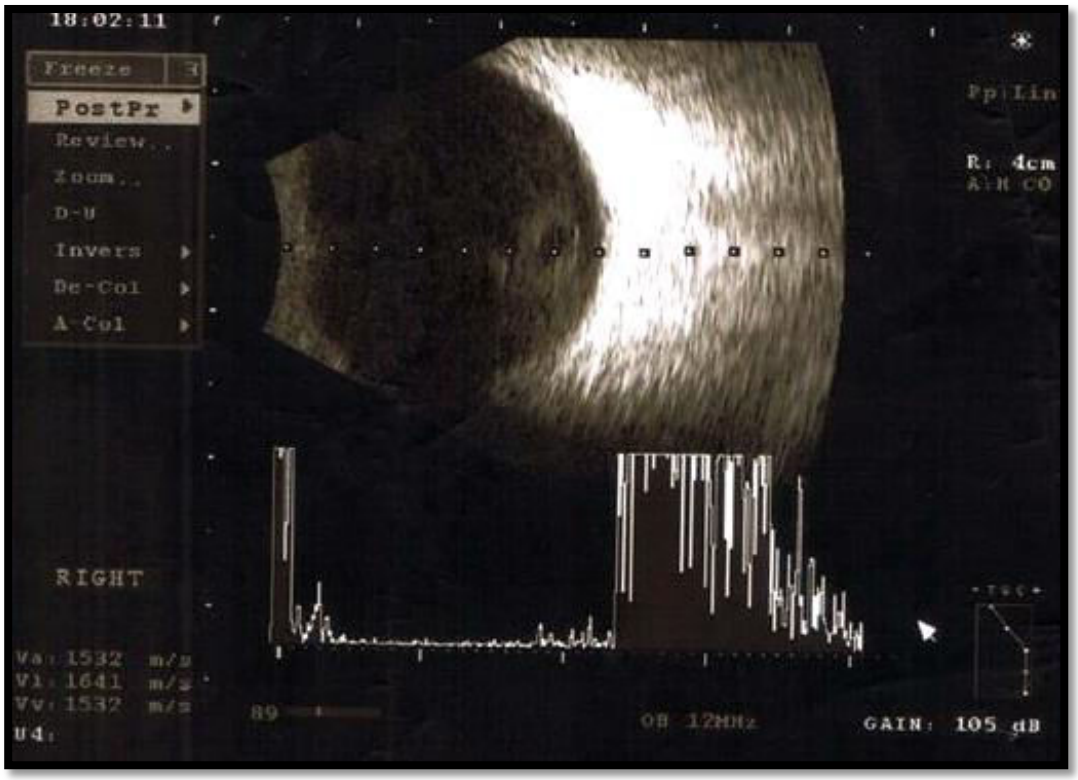
CASE 3

CAUSE FOR NON-VISUALISATION OF FUNDUS:

LE – Senile Mature Cataract with coloboma of the iris

B-SCAN DIAGNOSIS:

LE – Transverse B-scan showing an oval-shaped echolucent lens nucleus in the posterior vitreous close to the surface of the retina suggestive of coloboma.



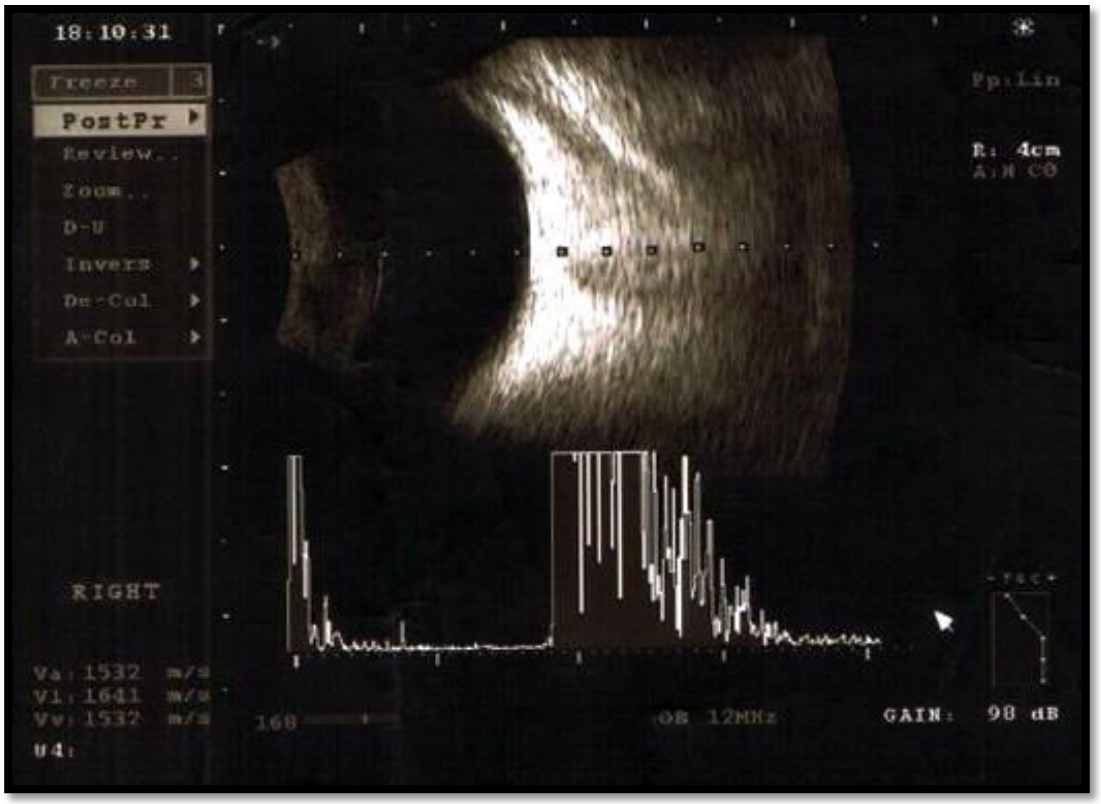
CASE 4

CAUSE FOR NON-VISUALISATION OF FUNDUS:

RE – Congenital cataract

B-SCAN DIAGNOSIS:

RE – Axial b-scan showing cataractous lens, echolucent vitreous with **normal retina** and optic nerve and an axial length of 18mm.



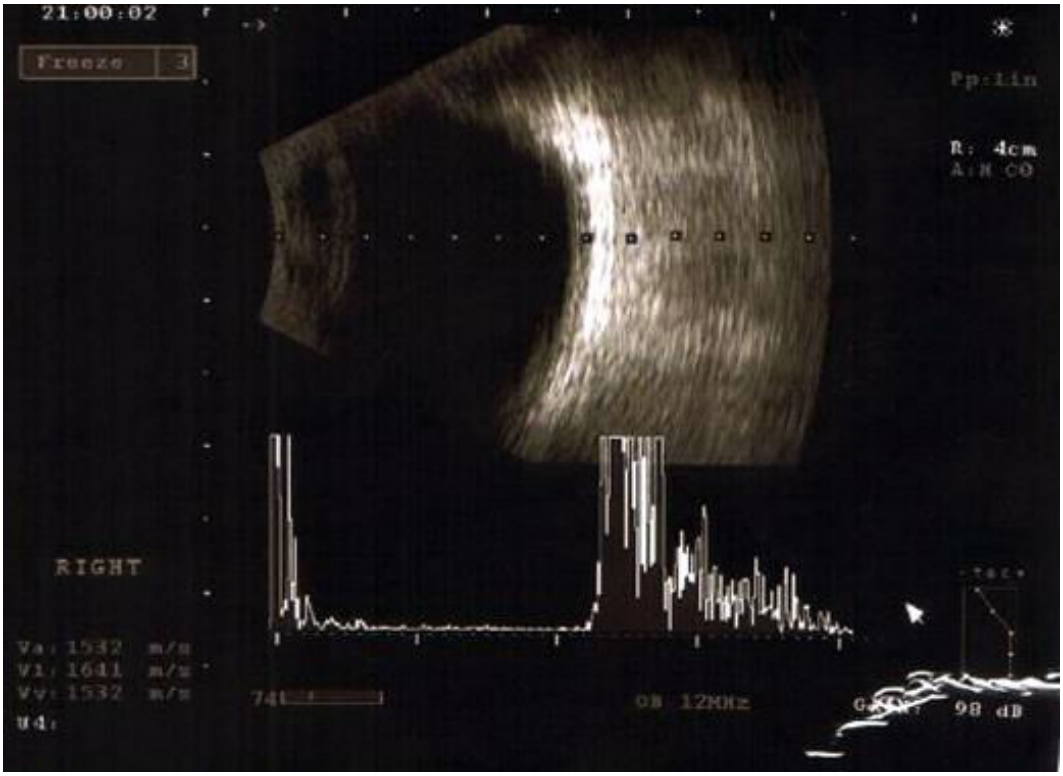
CASE 5

CAUSE FOR NON-VISUALISATION OF FUNDUS:

RE – Senile Mature Cataract

B-SCAN DIAGNOSIS:

RE – Transverse B-scan showing echolucent vitreous with **normal retina**.



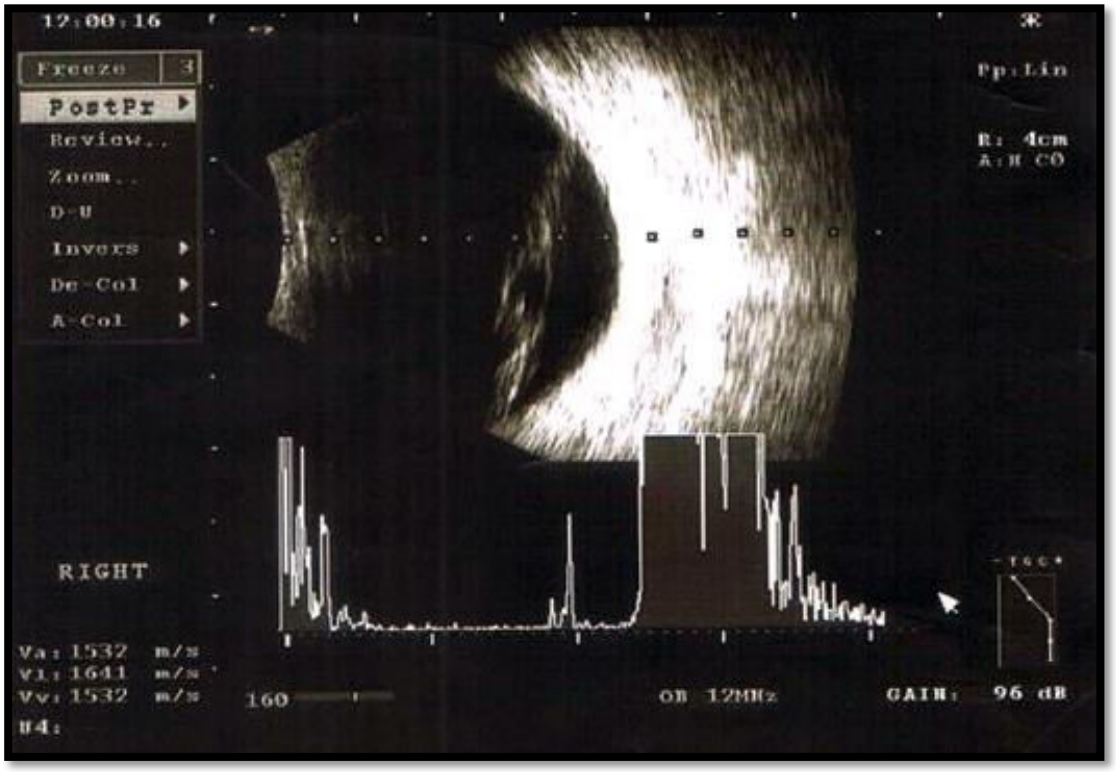
CASE 6

CAUSE FOR NON-VISUALISATION OF FUNDUS:

RE – Senile Mature Cataract

B-SCAN DIAGNOSIS:

RE – Transverse B-scan showing a **peripheral retinal detachment**



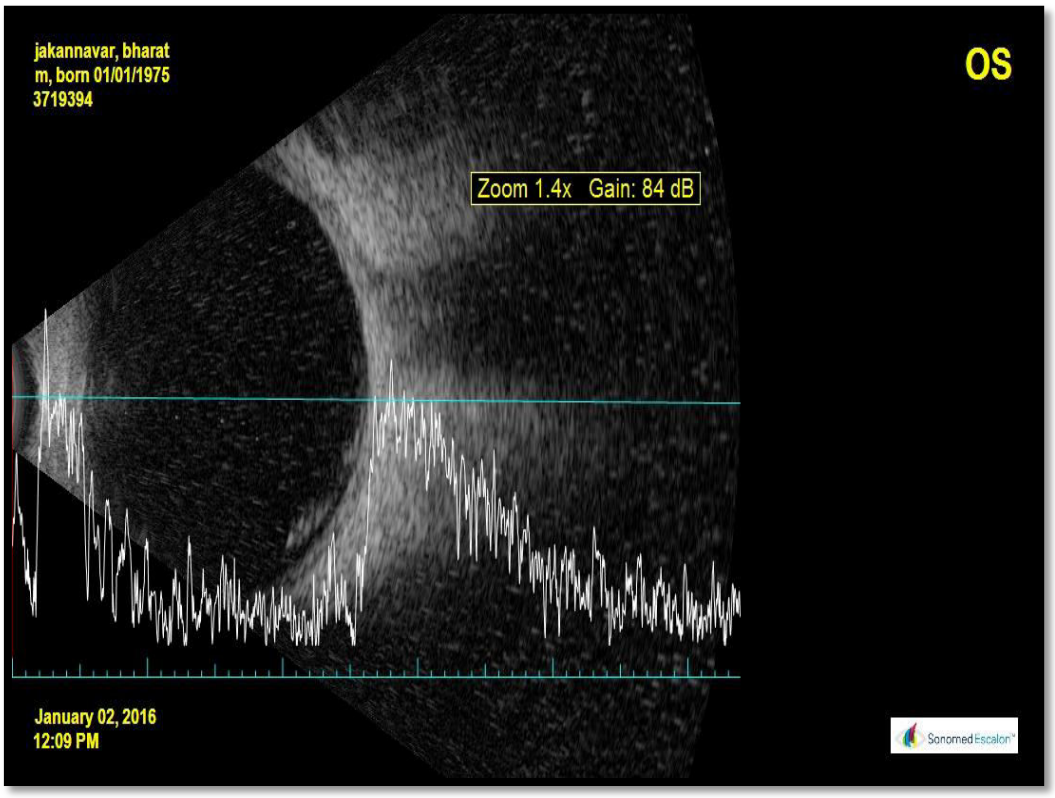
CASE 7

CAUSE FOR NON-VISUALISATION OF FUNDUS:

LE – Known case of type II diabetes mellitus with mature cataract

B-SCAN DIAGNOSIS:

LE – Transverse B-scan showing **posterior vitreous detachment**



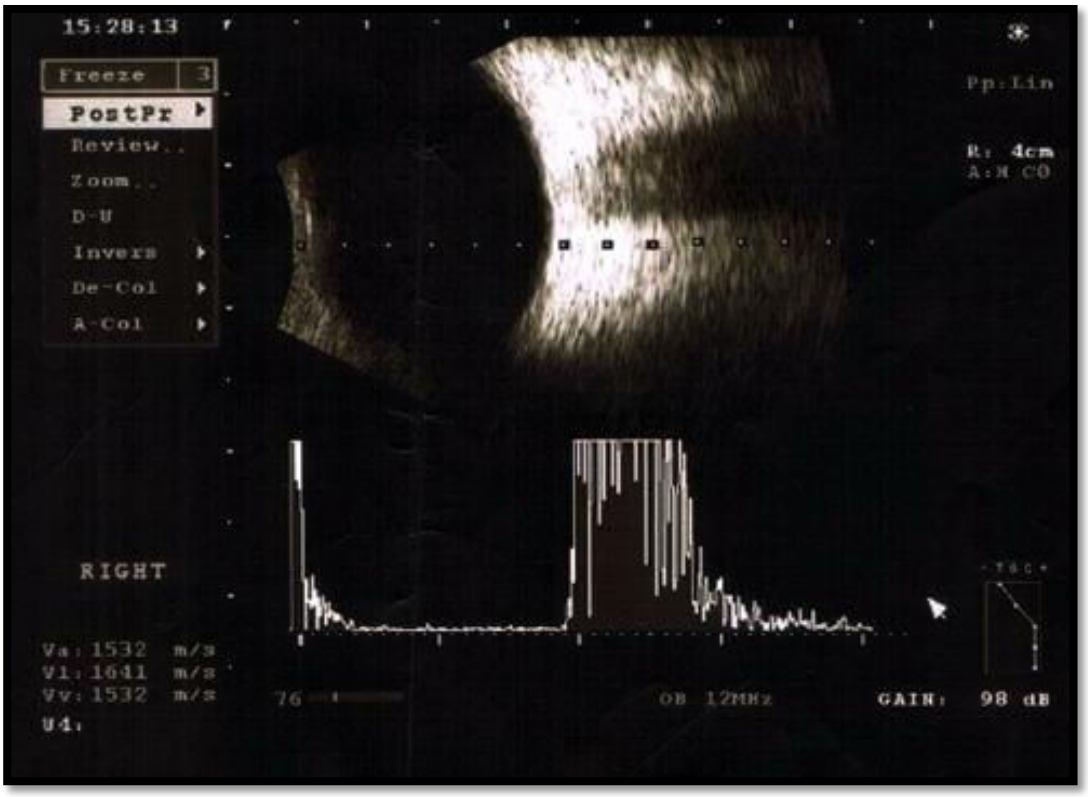
CASE 8

CAUSE FOR NON-VISUALISATION OF FUNDUS:

RE – Senile Mature Cataract

B-SCAN DIAGNOSIS:

RE – Axial B-scan showing cataractous lens, echolucent vitreous, **normal retina** and optic nerve.



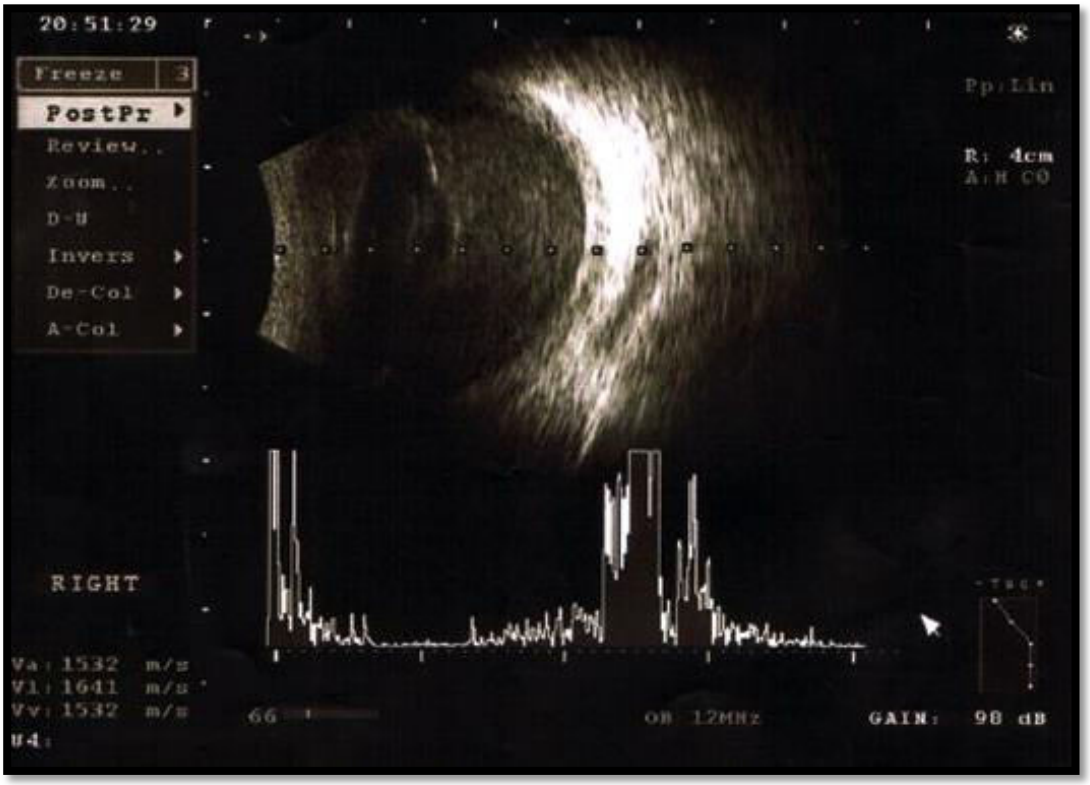
CASE 9

CAUSE FOR NON-VISUALISATION OF FUNDUS:

RE – Senile Mature Cataract

B-SCAN DIAGNOSIS:

RE – Horizontal transverse B-scan showing **dense vitreous hemorrhage**



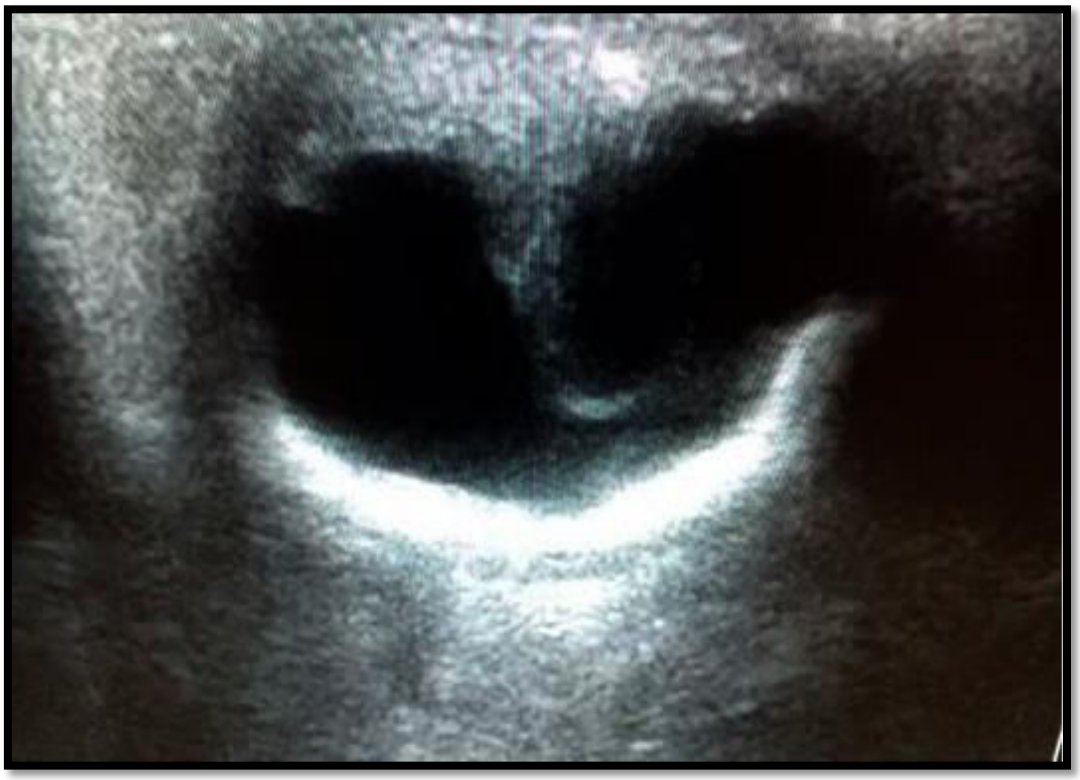
CASE 10

CAUSE FOR NON-VISUALISATION OF FUNDUS:

RE – Traumatic cataract

B-SCAN DIAGNOSIS:

RE – Axial B-scan showing T-shape **closed funnel shape retinal detachment**



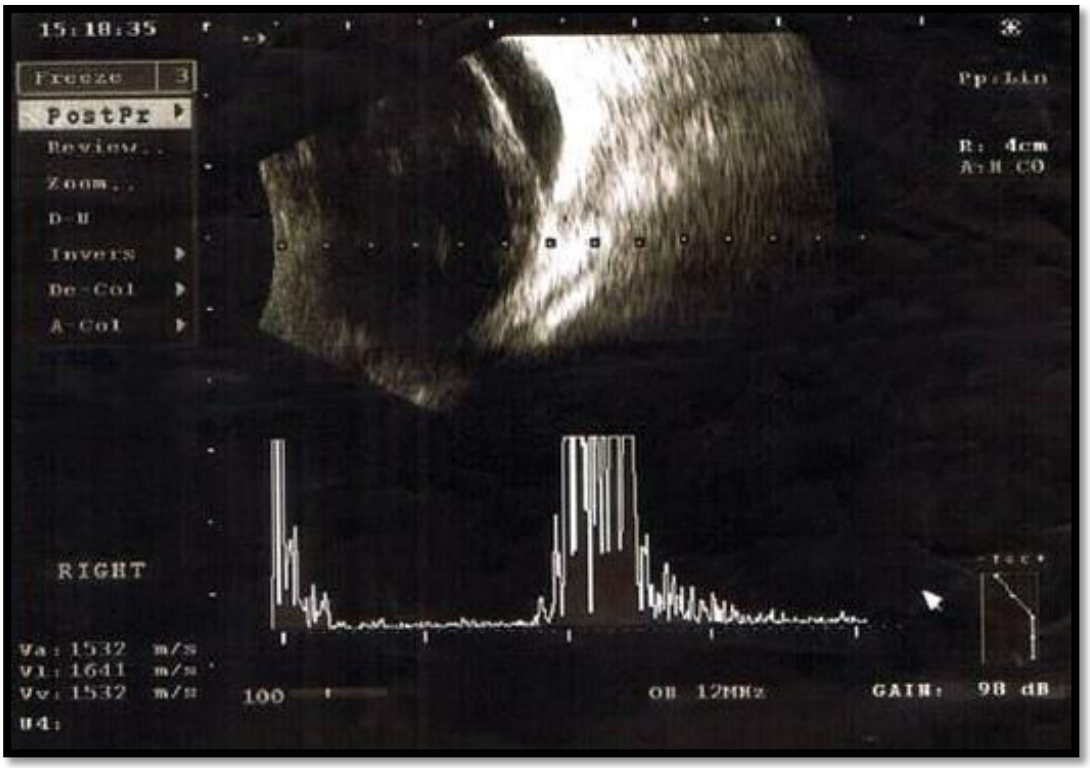
CASE 11

CAUSE FOR NON-VISUALISATION OF FUNDUS:

RE – known case of type II diabtetes mellitus with **nuclear sclerosis grade IV**

B-SCAN DIAGNOSIS:

RE – Transverse B-scan showing posterior vitreous detachment with **subhyaloid hemorrhage**



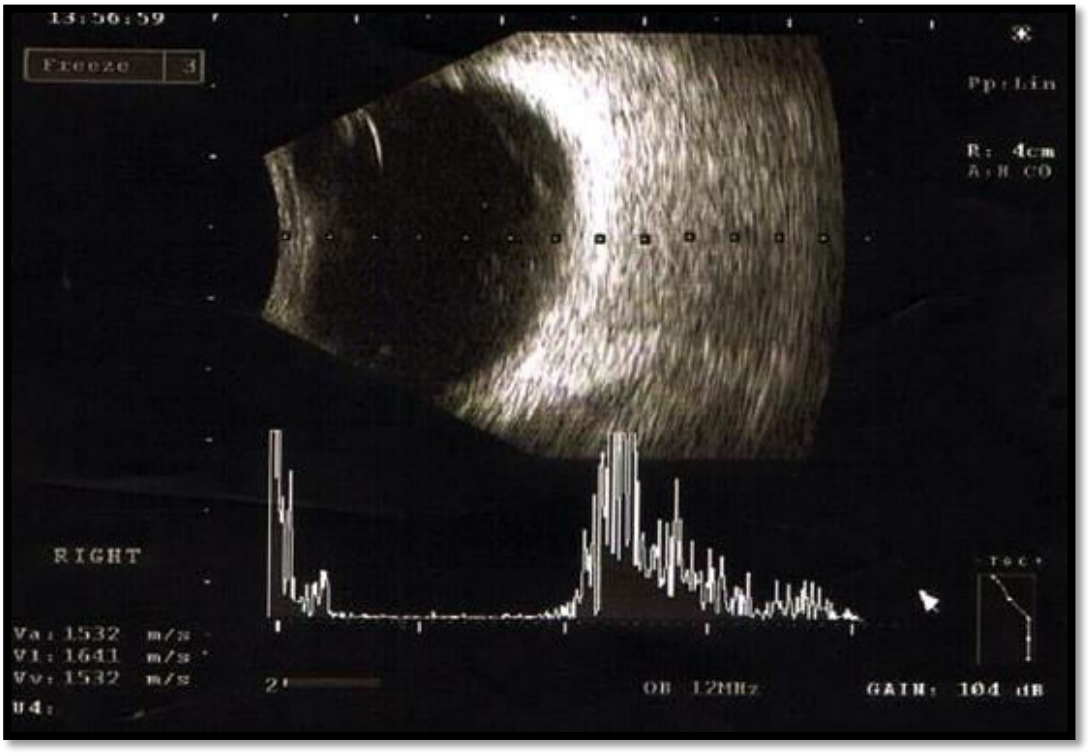
CASE 12

CAUSE FOR NON-VISUALISATION OF FUNDUS:

RE – Immature cortical **cataract**

B-SCAN DIAGNOSIS:

RE – Transverse b-scan showing dot like opacities in the vitreous cavity suggestive of **vitreous hemorrhage** with **subhyaloid hemorrhage** with **partial posterior vitreous detachment**.



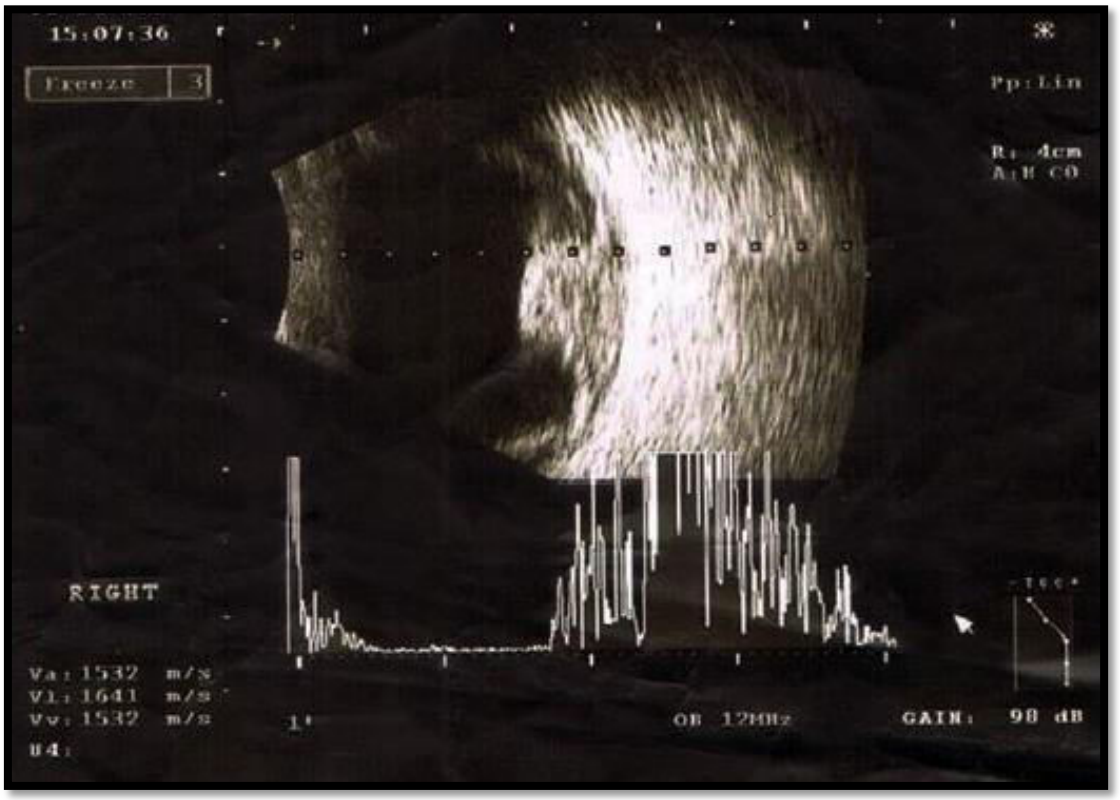
CASE 13

CAUSE FOR NON-VISUALISATION OF FUNDUS:

RE – Leucomatous **corneal opacity**

B-SCAN DIAGNOSIS:

RE – Transverse B-scan showing typical collar button-shaped **choroidal Mass**



Column1	Column2	Column3	Column4	Column5	Column6	Column7	Column8	Column9	Column10	Column11	Column12	Column14	Column142	Column15	Column16	Column17	Column18	Column19	Column20	Column21	Column22	Column23	Column24	Column25	Column26	Column27	Column28
SL. NO	OP/ IP NO	NAME	AGE	SEX	EYE INVOLVED	CLINICAL PRESENTATION	VISUAL ACUITY	CAUSE OF MEDIA OPACITY				A-SCAN		B SCAN FINDINGS							POST OP	FUNDOSCOPY					
							Va	CORNEA	PUPIL	ANTERIOR CHAMBER	LENS	AxL	B1: Axial length	B2: LENS	B3: VITREOUS	B4: RETINA	B5: CHOROID	B6: OPTIC NER	B7: SCLERA	B8: ORBIT	Va	VITREOUS	GLOW	RETINA	MACULA	ON HEAD	
1	642659	sidlingavva	50	F	LE	DOV	PL+Praccurate	clear			SMC	22.34	23.24	Cataractous	normal	Normal	normal	present	normal	normal	6\9	normal	present	normal	FR+	PRESENT	
2	3281287	Sardar	84	M	RE	DOV	PL+Praccurate	clear	Pseudoexfoliation		SMC	22.34	22.34	Cataractous	normal	Normal	normal	present	normal	normal	6\36	normal	present	normal	FR+	0.9	
3	3302086	Geeta	20	F	RE	DOV	PL+ve PR accurate	clear			Developemental catarcat	23.24	23.54	Cataractous	normal	Normal	normal	present	normal	normal	6\12	normal	present	normal	FR+	PRESENT	
4	3314828	Draupadi	65	F	LE	DOV	PL+Praccurate	clear			SMC	22.56	23.24	Cataractous	normal	Normal	normal	present	normal	normal	6\9	normal	present	normal	FR+	PRESENT	
5	648393	Yallappa	71	M	LE	DOV	PL+ve PR accurate				SMC	22.43	22.45	Cataractous	normal	Normal	normal	present	normal	normal	6\12	normal	present	normal	FR+	PRESENT	
6	648394	Laxavva	60	F	RE	DOV	HM+ve	clear			SMC	23.22	23.24	Cataractous	normal	Normal	normal	present	normal	normal	6\18	normal	present	normal	FR+	PRESENT	
7	3323621	Shivappa Mane	70	M	LE	DOV	PL+Praccurate		posterior synechiae			22.34	22.45	Cataractous	normal	Normal	normal	present	normal	normal	6\12	normal	present	normal	EDEMA	PRESENT	
8	3323535	Basavva	60	F	RE	DOV	PL+ve PR accurate	clear			SMC	21.78	23.24	Cataractous	normal	Normal	normal	present	normal	normal	6\6	normal	present	normal	FR+	PRESENT	
9	648905	Saraswati	65	F	LE	D0V	PL+Praccurate	clear			HMC	22.45	22.65	Cataractous	normal	Normal	normal	present	normal	normal	6\9	normal	present	normal	FR+	PRESENT	
10	2344872	Vijaya Chavan	60	F	RE	DOV	PL+ve PR accurate	OPACITY			SMC	23.46	23.24	Cataractous	Degeneration	Normal	normal	present	normal	normal	6\36	degeneration	present	normal	macular edem	PRESENT	
11	3330988	Shantabai Magadum	50	F	RE	DOV	PL+ve PR accurate	clear			SMC	24.54	24.54	Cataractous	degeneration	Normal	normal	present	normal	normal	6\60	degeneration	present	normal	fr dull	PRESENT	
12	3331904	Salim Samadar	48	M	RE	DOV	PL+Praccurate	clear			SMC	22.34	23.24	Cataractous	normal	Normal	normal	present	normal	normal	6\24	normal	present	normal	FR+	PRESENT	
13	3377568	Basangouda Patil	56	M	RE	DOV	HM+ve				SMC	23.27	23.54	Cataractous	normal	Normal	normal	present	normal	normal	6\12	normal	present	normal	FR+	PRESENT	
14	3355302	Pandurang	43	M	RE	DOV	HM+ve	clear			PSMC	22.34	23.24														
15	632149	Pandurang	55	M	RE	DOV	CF CF				\SMC	23.32	23.43	Cataractous	HAEMORRAGE W	NORMAL	normal	present	normal	normal	CF3M	SUBHYALOID H.	present	RD	dnmo	PRESENT	
16	3359323	Kashavva	80	F	RE	DOV	PL+Praccurate	clear			SMC	22.45	23.24	Cataractous	normal	Normal	normal	present	normal	normal	6\9	normal	present	normal	FR+	PRESENT	
17	3368985	Kareppa	63	M	LE	DOV	CFCF				SMC	22.34	22.43	Cataractous	normal	Normal	normal	present	normal	normal	6\12	Normal	present	normal	FR+	PRESENT	
18	3372186	Boravva Hiremath	50	F	LE	DOV	HM+ve	haze			SMC	24.32	23.24	Cataractous	normal	RD	normal	present	normal	normal	PL+PR ACC	PVD	NO GLOW	RD	DNMO	DNMO	
19	3377582	Shivaputrappa	75	M	RE	DOV	PL+Praccurate				SMC	22.34	22.34	Cataractous	normal	Normal	normal	present	normal	normal	6\12	normal	present	normal	FR+	PRESENT	
20	657851	Rudrappa Paravva Kalur	40	F	RE	DOV	HM+ve	haze			PSMC	26.22	25.24	Cataractous	normal	Normal	normal	present	STAPHYLOMA	normal	6\24	normal	present	normal	fr dull	PRESENT	
21	3381335	Vimal Kusude	60	F	LE	DOV	HM+ve	clear			SMC	23.32	23.65	Cataractous	normal	Normal	normal	present	normal	normal	6\12	normal	present	normal	FR+	PRESENT	
22	3385198	Alamprabhu	50	M	RE	DOV	PL+Praccurate	clear			SMC	22.34	23.24	Cataractous	PVD	Normal	normal	present	normal	normal	6\24	PVD	present	normal	FR DULL	PRESENT	
23	3385199	Manohar	55	M	RE	DOV	HM+ve	clear			SMC	22.34	22.45	Cataractous	normal	Normal	normal	present	normal	normal	6\12	normal	present	normal	FR+	PRESENT	
24	3389391	Yallavva	45	F	LE	DOV	HM+ve	clear			SMC	23.32	23.24	Cataractous	PVD	Normal	normal	present	normal	normal	CF3M	PVD	present	normal	HOLE+	PRESENT	
25	3393899	Rukmini	63	F	RE	DOV	CF-CF	clear			SMC	26.45	26.76	Cataractous	normal	Normal	normal	present	SCLERAL BUCK	normal	6\36	normal	present	POST RD	fr dull	PRESENT	
26	3395462	Krishnavva	62	F	LE	DOV	PL+Praccurate	clear	Pseudoexfoliation		SMC	22.34	23.24	Cataractous	normal	Normal	normal	present	normal	normal	6\24	normal	present	normal	fr dull	0.6	
27	625789	Debrath	23	M	RE	DOV	PL+Praccurate	clear			Developemental catarcat	23.43	23.43	Cataractous	normal	RD	normal	present	normal	normal	6\9						
28	659875	Mallawwa	65	F	RE	DOV	PL+Praccurate	clear			SMC	22.34	23.24	Cataractous	OPACITIES	Normal	normal	present	normal	normal	6\36	VIT.OPACITY	present	normal	FRDULL	PRESENT	
29	661559	Jamlabi	55	F	RE	DOV	PL+ve PR accurate				SMC	22.43	22.65	Cataractous	normal	Normal	normal	present	normal	normal	6\24	normal	present	normal	FR+	PRESENT	
30	661560	Avakka	60	F	LE	DOV	HM+ve				SMC	22.34	23.24	Cataractous	normal	Normal	normal	present	normal	normal	6\6	normal	present	normal	FR+	PRESENT	
31	661561	Ningappa	60	M	RE	DOV	HM+ve	clear			SMC	22.34	22.44	Cataractous	normal	Normal	normal	present	normal	normal	6\9	normal	present	normal	FR+	PRESENT	
32	3407584	Balaih	58	M	LE	DOV	PL+ve PR accurate				SMC	23.54	23.24	Cataractous	normal	Normal	normal	present	normal	normal	6\9	normal	present	normal	FR+	PRESENT	
33	662744	Sidagouda	80	M	LE	DOV	PL+Praccurate	CLEAR			BROWN CATARACT	22.34	22.65	Cataractous	normal	Normal	normal	present	normal	normal	6\12	normal	present	normal	FR+	PRESENT	
34	3419725	Siddappa	52	M	RE	DOV	HM+ve	clear			BROWN CATARACT	26.65	23.24	Cataractous	OPACITIES	Normal	THICKENING	present		Normal	6\60	SNOW BALL OPACIT	present	normal	fr dull	PRESENT	
35	8825988	Jagadish	60	M	RE	DOV	PL+Praccurate	clear			SMC	23.22	23.54	Cataractous	PVD	Normal	normal	present	normal	normal	6\24	normal	present	normal	FR+	PRESENT	
36	662765	Sabalawwa	48	F	LE	DOV	CF1/4m	clear			SMC	22.45	23.24	Cataractous	normal	Normal	normal	present	normal	normal	6\12	normal	present	normal	FR+	PRESENT	
37	662567	Dundawwa	60	F	RE	DOV	cfcf	clear			SMC	22.34	22.45	Cataractous	normal	Normal	normal	present	normal	normal	6\9	normal	present	normal	FR+	PRESENT	
38	664567	Shivrai	56	M	RE	DOV	PL+Praccurate	clear			SMC	22.34	23.24	Cataractous	normal	Normal	normal	present	normal	normal	6\12	normal	present	normal	FR+	PRESENT	

39	456767	Narayan	60	M	LE	DOV	HM+ve	CLEAR			SMC	22.34	22.54	Cataractous	normal	Normal	normal	present	normal	normal	6\12	normal	present	normal	FR+	PRESENT	
40	663453	Kadappa	60	M	LE	DOV	PL+ve PR accurate	clear			SMC	22.23	23.24	Cataractous	normal	Normal	normal	present	normal	normal	6\24	normal	present	normal	FR+	PRESENT	
41	662345	Parsappa	60	M	LE	DOV	HM+ve	clear			SMC	22.45	22.34	Cataractous	normal	Normal	normal	present	normal	normal	6\9	normal	present	normal	FR+	PRESENT	
42	3439437	Manohar	50	M	LE	DOV	PL+Praccurat e	clear			SMC	22.54	23.24	Cataractous	normal	Normal	normal	present	normal	normal	6\6	normal	present	normal	FR+	PRESENT	
43	2405451	Atmanand	34	M	RE	DOV	PL+ve PR accurate	clear			Radiation cataract	22.34	22.54	Cataractous	normal	Normal	normal	present	normal	normal	6\9	normal	present	normal	FR+	PRESENT	
44	3456587	Gangawwa Shivpuri	73	F	LE	DOV	PL+ve PR accurate	clear			SMC	27.54	23.24	Cataractous	normal	Normal	normal	present	STAPHYLOMA	normal	6\60	FLOATERS	present	normal	fr dull	PRESENT	
45	3467952	Kashaba Madane	55	M	RE	DOV	PL+ve PR accurate	clear			SMC	22.45	22.34	Cataractous	normal	Normal	normal	present	normal	normal	6\9	normal	present	normal	FR+	PRESENT	
46	2833091	Shambuling Hiremath	30	M	LE	DOV	HM+ve	clear			PSMC	22.34	23.24	Cataractous	normal	Normal	normal	present	normal	normal	6\12	normal	present	normal	FR+	PRESENT	
47	2743851	Bhimappa Kanamadi	38	M	RE	DOV	HM+ve				SMC	23.32	23.54	Cataractous	normal	Normal	normal	present	normal	normal	6\12	normal	present	normal	FR+	PRESENT	
48	672915	Mahadev Totagi	67	M	LE	DOV	HM+ve	clear			SMC	23.27	23.24	Cataractous	normal	RD	normal	present	normal	normal	PL+PR ACC	PVD	NO GLOW	RD	DNMO	DNMO	
49	2210403	Annapurna Chougule	50	F	LE	DOV	PL+Praccurat e	CLEAR			SMC	22.34	22.43	Cataractous	normal	Normal	normal	present	normal	normal	6\12	normal	present	normal	FR+	PRESENT	
50	673035	Drakshayini	57	F	RE	DOV	PL+ve PR accurate	CLEAR			SMC	23.54	23.24	Cataractous	normal	Normal	normal	present	normal	normal	6\9	normal	present	normal	FR+	PRESENT	
51	3474642	Hnamant Harijan	80	M	LE	DOV	HM+ve	clear			SMC	24.55	24.54	Cataractous	Haemorhage	RD	normal	present	normal	normal	PL+PR INACC	HAEMORRHAGE	NO GLOW	RD	DNMO	DNMO	
52	186201501	Mallikarjun	52	M	LE	DOV	CFCF	clear			SMC	22.65	23.24	Cataractous	normal	Normal	normal	present	normal	normal	6\24	normal	present	normal	FR+	PRESENT	
53	3477842	Tukaram Badiger	12	M	LE	DOV	cfcf	clear			Developemental catarcat	22.76	22.34	Cataractous	normal	Normal	normal	present	normal	normal	6\9	normal	present	normal	FR+	PRESENT	
54	2653084	Manohar Chougule	60	M	RE	DOV	PL+Praccurat e	clear			SMC	22.65	23.24	Cataractous	normal	Normal	normal	present	normal	normal	6\36	normal	present	normal	FR+	PRESENT	
55	3480910	Tangewwa	50	F	RE	DOV	CFCF	clear			SMC	22.34	22.54	Cataractous	normal	Normal	normal	present	normal	normal	6\24	normal	present	normal	FR+	PRESENT	
56	3480916	Krishnabai Atapade	65	F	LE	DOV	PL+Praccurat e	clear			SMC	23.32	23.24	Cataractous	normal	Normal	normal	present	normal	normal	6\18	normal	present	normal	FR+	PRESENT	
57	3462589	Rudrappa Myageri	45	M	RE	DOV	HM+ve	clear			SMC	22.34	22.54	Cataractous	normal	Normal	normal	present	normal	normal	6\9	normal	present	normal	FR+	PRESENT	
58	3481981	Chinavva Kulkarni	59	F	LE	DOV	PL+ve PR inaccurate	clear			SMC	23.54	23.24	Cataractous	normal	RD	normal	present	normal	normal	PL+PRACC	normal	NO GLOW	RD	DNMO	DNMO	
59	3484789	Balavva	45	F	RE	high myopia	CF CF				SMC	27.54	27.54	Cataractous	PVD	RD	normal	present	STAPHYLOMA	normal	6\60						
60	3484681	Adinath	65	M	LE	DOV	CFCF	clear			SMC	23.43	23.24	Cataractous	normal	Normal	normal	present	normal	normal	6\24	normal	present	normal	FR+	PRESENT	
61	3484760	Savitri Anoji	60	F	LE	DOV	PL+ve PR accurate	clear			SHMC	22.34	22.54	Cataractous	normal	Normal	normal	present	normal	normal	6\12	normal	present	normal	FR+	PRESENT	
62	2853427	Laxmibai Gondali	65	F	RE	DOV	HM+ve				SMC	23.54	23.24	Cataractous	normal	Normal	normal	present	normal	normal	6\9	normal	present	normal	FR+	PRESENT	
63	2855467	Tavanavva	60	F	RE	DOV	PL+ve PR accurate	clear			SMC	22.34	22.54	Cataractous	normal	Normal	normal	present	normal	normal	6\9	normal	present	normal	FR+	PRESENT	
64	2855478	Masanu	75	M	RE	DOV	PL+ve PR accurate	clear			SMC	22.34	23.24	Cataractous	normal	NORMAL	normal	present	normal	normal	6\12	normal	present	normal	FR+	PRESENT	
65	2855479	Gouravva	65	F	RE	DOV	CFCF	clear			SMC	25.44	25.54	Cataractous	normal	NORMAL	normal	present	STAPHYLOMA	normal	6\60	OPACITY	present	normal	fr dull	PRESENT	
66	2855480	Parvati	65	F	RE	DOV	CFCF	clear			SMC	23.34	23.24	Cataractous	normal	Normal	normal	present	normal	normal	6\12	normal	present	normal	FR+	PRESENT	
67	2855676	Rama	48	M	RE	DOV	CFCF	clear			SMC	22.34	22.43	Cataractous	normal	Normal	normal	present	normal	normal	6\12	Normal	present	normal	FR+	PRESENT	
68	2331998	Sunil Shadabale	25	M	RE	DOV	HM+ve				PSMC	23.43	23.24	Cataractous	normal	Normal	normal	present	normal	normal	6\60	normal	present	normal	FR+	PRESENT	
69	3490293	Channal Wali	58	M	RE	DOV	PL+ve PR accurate	clear			SMC	22.34	22.65	Cataractous	normal	Normal	normal	present	normal	normal	6\36	normal	present	normal	FR+	PRESENT	
70	3492747	Manda Balekundri	45	F	RE	DOV	HM+ve	CLEAR			SMC	23.43	23.24	Cataractous	normal	Normal	normal	present	normal	normal	6\12	normal	present	normal	FR+	PRESENT	
71	79947	Ashitha	29	F	RE	DOV	CF 1m				PSMC	23.34	23.56	Cataractous	normal	Normal	normal	present	normal	normal	6\9	normal	present	normal	FR+	PRESENT	
72	25389	Radhika	9	F	RE	DOV	PL+ve PR accurate				Congenital catarcat	22.34	23.24	Cataractous	normal	Normal	normal	present	normal	normal	CF3M	normal	present	normal	FR+	PRESENT	
73	79188	Yarappa	56	M	LE	DOV	PL+ve PR accurate				SMC	23.56	23.43	Cataractous	normal	Normal	normal	present	normal	normal	6\9	normal	present	normal	FR+	PRESENT	
74	64273	Kiran	2	M	LE	DOV with leucocoria	CF CF				Congenital catarcat	23.34	23.24	Cataractous	normal	Normal	normal	present	normal	RETINOBLASTOMA							
75	1324614	Ningappa	50	m	LE	DOV	PL+Praccurat e	clear			SMC	22.34	22.45	Cataractous	opacities	Normal	normal	present	normal	normal	6\36	vitritis	present	normal	fr dull	PRESENT	
76	3494567	Rajeshwari	26	f	RE	DOV	PL+Praccurat e	clear			SMC	22.34	23.24	Cataractous	normal	Normal	normal	present	normal	normal	6\12	normal	present	normal	FR+	PRESENT	
77	3495508	Irawwa	45	F	LE	DOV	PL+ve PR accurate	clear			SMC	23.24	23.34	Cataractous	PVD	Normal	normal	present	normal	normal	6\24	PVD	present	normal	fr dull	PRESENT	
78	3485945	Dareppa	65	m	LE	DOV	PL+Praccurat e	clear			SMC	22.56	23.24	Cataractous	normal	Normal	normal	present	normal	normal	6\9	normal	present	normal	FR+	PRESENT	
79	3462529	Rudrappa	45	M	LE	DOV	PL+ve PR accurate				SMC	22.43	22.45	Cataractous	PVD	Normal	normal	present	normal	normal	6\12	PVD	present	normal	FR+	PRESENT	
80	3498887	SHRIPAL	80	M	LE	DOV	HM+ve	clear			SMC	23.22	23.45	Cataractous	normal	RD	normal	present	normal	normal	PL+PRACC	PVD	NO GLOW	RD	DNMO	DNMO	
81	3500041	ANNAPPA	70	M	RE	DOV	PL+Praccurat e	HAZY			SMC	22.34	23.24	Cataractous	normal	Normal	normal	present	normal	normal	6\12	normal	present	normal	FR+	PRESENT	

82	3506342	Padmavva	60	F	RE	DOV	PL+ve PR accurate	clear			SMC	21.78	21.45	Cataractous	normal	Normal	normal	present	normal	normal	6\6	normal	present	normal	FR+	PRESENT	
83	6786988	Basavangarevva	65	F	LE	D0V	PL+Praccurate	clear			SMC	22.45	22.56	Cataractous	normal	Normal	normal	present	normal	normal	6\9	normal	present	normal	FR+	PRESENT	
84	798685	Shivalingavva	60	F	LE	DOV	PL+ve PR accurate	clear			SMC	23.46	23.24	Cataractous	Degeneration	Normal	normal	present	normal	normal	6\36	degeneration	present	normal	fr dull	PRESENT	
85	671233	Rudrappa	50	m	LE	DOV	PL+ve PR accurate	clear			SMC	24.54	24.67	Cataractous	degeneration	Normal	normal	present	normal	normal	6\60	degeneration	present	normal	fr dull	PRESENT	
86	3510236	Balagouda	50	M	RE	DOV	PL+Praccurate	clear			SMC	22.34	23.24	Cataractous	normal	Normal	normal	present	normal	normal	6\24	normal	present	normal	FR+	PRESENT	
87	3377568	Basangouda Patil	56	M	RE	DOV	HM+ve				SMC	23.27		Cataractous	normal	Normal	normal	present	normal	normal	6\12	normal	present	normal	FR+	PRESENT	
88	3326486	Reema	41	f	RE	DOV	HM+ve	clear			PSMC	22.34	23.24	Cataractous	normal	Normal	normal	present	normal	normal	6\12	normal	present	normal	fr+	PRESENT	
89	3507891	irawwa harijan	40	f	RE	DOV	CF CF				SMC	23.45	23.57	Cataractous	HAEMORRAGE W	NORMAL	normal	present	normal	normal	CF3M	SUBHYALOID H.	present	normal	fr dull	PRESENT	
90	3511857	Jhanevva	80	F	RE	DOV	PL+Praccurate	clear			SMC	22.45	23.24	Cataractous	PVD	Normal	normal	present	normal	normal	6\24	PVD	present	normal	fr dull	PRESENT	
91	3507370	Suvarna	63	F	LE	DOV	CFCF				SMC	22.34	23.35	Cataractous	normal	Normal	normal	present	normal	normal	6\12	Normal	present	normal	FR+	PRESENT	
92	3512995	Irappa	50	M	RE	DOV	HM+ve	clear			SMC	24.32	23.24	Cataractous	normal	Normal	normal	present	normal	normal	6\24	normal	present	normal	fr dull	PRESENT	
93	653886	Sushila	75	f	RE	DOV	PL+Praccurate				SMC	22.34	22.73	Cataractous	normal	Normal	normal	present	normal	normal	6\12	normal	present	normal	FR+	PRESENT	
94	657887	Basappa	75	m	LE	DOV	HM+ve	clear			SMC	23.33	23.24	Cataractous	normal	Normal	normal	present	normal	normal	6\24	normal	present	normal	fr dull	PRESENT	
95	657338	Bagavva	60	F	LE	DOV	HM+ve	clear			SMC	23.32	23.43	Cataractous	normal	Normal	normal	present	normal	normal	6\12	normal	present	normal	FR+	PRESENT	
96	675893	Krishnappa	50	M	RE	DOV	PL+Praccurate	clear			SMC	22.34	23.24	Cataractous	normal	Normal	normal	present	normal	normal	6\24	normal	present	normal	FR DULL	PRESENT	
97	3518170	Gangaram	55	M	RE	DOV	HM+ve	clear			SMC	22.34	22.45	Cataractous	PVD	Normal	normal	present	normal	normal	6\12	normal	present	normal	FR+	PRESENT	
98	3517607	Mahesh	17	M	LE	DOV	HM+ve	clear			Developemental catarcat	23.32	23.24	Cataractous	normal	Normal	normal	present	normal	normal	6\12	normal	present	normal	fr dull	PRESENT	
99	681933	Sakhavva	63	F	RE	DOV	CF-CF	clear			SMC	24.44	24.67	Cataractous	pvd	Normal	normal	present	normal	normal	6\36	NOrmal	present	normal	fr dull	PRESENT	
100	3528600	Rukmini Lokhande	62	F	LE	DOV	PL+Praccurate	clear			SMC	22.34	23.24	Cataractous	normal	Normal	normal	present	normal	normal	6\24	normal	present	normal	fr dull	PRESENT	
101	3527863	Mangal	45	F	LE	DOV	PL+Praccurate	clear			SMC	23.43	23.45	Cataractous	PVD	Normal	normal	present	normal	normal	6\9	normal	present	normal	fr dull	PRESENT	
102	3532305	Jaffer	65	M	LE	DOV	PL+Praccurate	clear			SMC	22.34	23.24	Cataractous	PVD	Normal	normal	present	normal	normal	6\36	normal	present	normal	FRDULL	PRESENT	
103	3535207	Yallawwa	55	F	LE	DOV	PL+ve PR accurate				SMC	22.43		Cataractous	normal	Normal	normal	present	normal	normal	6\24	normal	present	normal	FR+	PRESENT	
104	3535709	Gouravva	70	F	LE	DOV	HM+ve				SMC	22.34	23.24	Cataractous	normal	Normal	normal	present	normal	normal	6\6	normal	present	normal	FR+	PRESENT	
105	3535177	Bhima	60	M	RE	DOV	HM+ve	clear			SMC	22.34		Cataractous	normal	Normal	normal	present	normal	normal	6\9	normal	present	normal	FR+	PRESENT	
106	3537756	Sadappa	58	M	LE	DOV	PL+ve PR accurate				SMC	23.54	23.24	Cataractous	normal	Normal	normal	present	normal	normal	6\9	normal	present	normal	FR+	PRESENT	
107	3537745	Narsappa	80	M	LE	DOV	PL+Praccurate	CLEAR			BROWN CATARACT	22.34		Cataractous	normal	Normal	normal	present	normal	normal	6\12	normal	present	normal	FR+	PRESENT	
108	3540975	Dastagir	70	M	RE	DOV	HM+ve	clear			BROWN CATARACT	26.65	23.24	Cataractous	OPACITIES	Normal	THICKENING	present		Normal	6\60	Vit.opacity	present	normal	fr dull	PRESENT	
109	3541112	Irawwa	60	F	RE	DOV	PL+Praccurate	clear			SMC	23.22		Cataractous	normal	Normal	normal	present	normal	normal	6\24	normal	present	normal	FR+	PRESENT	
110	3541313	Ashok	60	M	LE	DOV	CFCF	clear			SMC	22.45	23.24	Cataractous	normal	Normal	normal	present	normal	normal	6\12	normal	present	normal	FR+	PRESENT	
111	3541957	Nagavva	60	F	RE	DOV	cfcf	clear			SMC	22.34		Cataractous	normal	Normal	normal	present	normal	normal	6\9	normal	present	normal	FR+	PRESENT	
112	3541931	Shreya	56	F	RE	DOV	PL+Praccurate	clear			SMC	22.34	23.24	Cataractous	normal	Normal	normal	present	normal	normal	6\12	normal	present	normal	FR+	PRESENT	
113	3543780	Vijaymala	60	F	LE	DOV	HM+ve	CLEAR			SMC	22.34		Cataractous	opacities	Normal	normal	present	normal	normal	6\12	OPACITY	present	normal	FR+	PRESENT	
114	3548358	Nagappa	60	M	LE	DOV	PL+ve PR accurate	clear			SMC	22.23	23.24	Cataractous	normal	Normal	normal	present	normal	normal	6\24	normal	present	normal	FR+	PRESENT	
115	809600	Shettu	70	M	RE	DOV	HM+ve	clear			SMC	22.45		Cataractous	normal	Normal	normal	present	normal	normal	6\9	normal	present	normal	FR+	PRESENT	
116	3550460	Laxman	60	M	LE	DOV	PL+Praccurate	clear			SMC	22.54	23.24	Cataractous	normal	Normal	normal	present	normal	normal	6\6	normal	present	normal	FR+	PRESENT	
117	3558645	Gurusidappa	50	M	RE	DOV	PL+ve PR accurate	clear			SMC	22.34		Cataractous	normal	Normal	normal	present	normal	normal	6\9	normal	present	normal	FR+	PRESENT	
118	687645	Yallappa	73	M	LE	DOV	PL+ve PR accurate	clear			SMC	27.54	23.24	Cataractous	normal	Normal	normal	present	normal	normal	6\60	normal	present	normal	fr dull	PRESENT	
119	2992131	Sharada Kudtalkar	67	F	RE	DOV	PL+ve PR accurate	clear			SMC	22.45		Cataractous	normal	Normal	normal	present	normal	normal	6\9	normal	present	normal	FR+	PRESENT	
120	3566873	Jayawanti	60	F	RE	DOV	HM+ve	clear			SMC	22.34	23.24	Cataractous	PVD	Normal	normal	present	normal	normal	6\12	normal	present	normal	FR+	PRESENT	
121	3577330	Chanayya	70	M	RE	DOV	HM+ve				SMC	23.32		Cataractous	normal	Normal	normal	present	normal	normal	6\12	normal	present	normal	FR+	PRESENT	
122	3585488	Madarsab	67	M	RE	DOV	HM+ve	clear			SMC	23.27	23.24	Cataractous	PVD	Normal	normal	present	normal	normal	6\60	normal	present	normal	FR+	PRESENT	
123	2776447	Hasansab Mulla	50	M	LE	DOV	PL+Praccurate	CLEAR			SMC	22.34		Cataractous	Degeneration	Normal	normal	present	normal	normal	6\12	normal	present	normal	FR+	PRESENT	
124	3608843	Subhash	57	M	LE	DOV	PL+ve PR accurate	CLEAR			SMC		23.24	Cataractous	normal	Normal	normal	present	normal	normal	6\9	normal	present	normal	FR+	PRESENT	
125	3610490	Kalmesh	80	M	RE	DOV	HM+ve	clear			SMC	24.55		Cataractous	normal	Normal	normal	present	normal	normal	6\12	normal	present	normal	FR+	PRESENT	
126	3561020	Suresh	52	M	LE	DOV	CFCF	clear			SMC	22.65	23.24	Cataractous	normal	Normal	normal	present	normal	normal	6\24	normal	present	normal	FR+	PRESENT	
127	3611539	Mashali Nadaf	70	F	RE	DOV	cfcf	clear			smc	26.76	27.23	Cataractous	normal	OLD RD	normal	present	STAPHYLOMA	normal	PL+PRACC	normal	NO GLOW	RD	DNMO	DNMO	
128	3632377	Bhimappa	60	M	RE	DOV	PL+Praccurate	clear			SMC	22.65	23.24	Cataractous	normal	Normal	normal	present	normal	normal	6\36	normal	present	normal	FR+	PRESENT	

129	3636396	Shanta	50	F	RE	DOV	CFCF	clear			SMC	22.34	22.43	Cataractous	normal	Normal	normal	present	normal	normal	6\24	normal	present	normal	FR+	PRESENT	
130	3636771	Basavva	65	F	LE	DOV	PL+Praccurat e	clear			SMC	23.32	23.24	Cataractous	normal	Normal	normal	present	normal	normal	6\18	normal	present	normal	FR+	PRESENT	
131	301095	Demavva	45	F	LE	DOV	HM+ve	clear			SMC	22.34	22.45	Cataractous	normal	Normal	normal	present	normal	normal	6\9	normal	present	normal	FR+	PRESENT	
132	301195	Ramakka	59	F	RE	DOV	PL+ve PR inaccurate	clear			SMC	23.54	23.24	Cataractous	normal	Normal	normal	present	normal	normal	6\9	normal	present	Normal	FR+	PRESENT	
133	301295	Gangu	45	F	RE	DOV	CF CF				SMC	22.34	.22.34	Cataractous	normal	Normal	normal	present	Normal	normal	6\24	normal	present	normal	FR+	PRESENT	
134	301395	Yashoda	65	F	RE	DOV	CFCF	clear			SMC	23.23	23.24	Cataractous	normal	Normal	normal	present	normal	normal	6\24	normal	present	normal	FR+	PRESENT	
135	3639325	Droupada	60	F	LE	DOV	PL+ve PR accurate	clear			SHMC	22.34	22.45	Cataractous	normal	Normal	normal	present	normal	normal	6\12	normal	present	normal	FR+	PRESENT	
136	2357796	Irappa	65	M	RE	DOV	HM+ve				SMC	22.34	23.24	Cataractous	normal	Normal	normal	present	normal	normal	6\9	normal	present	normal	FR+	PRESENT	
137	3641444	Goudappa	60	M	RE	DOV	PL+ve PR accurate	clear			SMC	22.34	22.43	Cataractous	normal	Normal	normal	present	normal	normal	6\9	normal	present	normal	FR+	PRESENT	
138	3642607	Babu Shankar	75	M	RE	DOV	PL+ve PR accurate	clear			SMC	22.34	23.24	Cataractous	normal	NORMAL	normal	present	normal	normal	6\12	normal	present	normal	FR+	PRESENT	
139	3639497	Shobha Desai	65	F	RE	DOV	CFCF	clear			SMC	22.44	22.34	Cataractous	normal	NORMAL	normal	present	normal	normal	6\24	Normal	present	normal	fr dull	PRESENT	
140	3647253	Dhondiba	65	M	RE	DOV	CFCF	clear			SMC	23.12	23.24	Cataractous	normal	RD	normal	present	normal	normal							
141	3613619	Rukmini Savant	60	F	RE	DOV	CFCF	clear			SMC	22.34	22.46	Cataractous	normal	Normal	normal	present	normal	normal	6\12	Normal	present	normal	FR+	PRESENT	
142	3612951	Rukmini Chunari	50	F	RE	DOV	HM+ve				SMC	23.12	23.24	Cataractous	normal	Normal	normal	present	normal	normal	6\24	normal	present	normal	FR+	PRESENT	
143	3612015	Sanadhi Laxmi	58	F	RE	DOV	PL+ve PR accurate	clear			SMC	22.34	22.23	Cataractous	normal	Normal	normal	present	normal	normal	6\36	normal	present	normal	FR+	PRESENT	
144	3612503	Sattu Basargi	66	M	RE	DOV	HM+ve	CLEAR			SMC	22.34	22.45	Cataractous	normal	RD	normal	present	normal	normal							
145	45	3612104	Limbaji	50	M	LE	DOV	PL+Praccurat e	clear			SMC	22.45	22.34	Cataractous	normal	Normal	normal	present	normal	normal	6\9	normal	present	normal	FR+	PRESENT	
146	46	3612887	Nagappa	84	M	RE	DOV	PL+Praccurat e	clear			SMC	22.34	22.34	Cataractous	normal	Normal	normal	present	normal	normal	6\36	normal	present	normal	FR+	PRESENT	
147	47	2947190	Kashavva	50	F	LE	DOV	PL+ve PR accurate	clear			SMC	23.12	23.24	Cataractous	normal	Normal	normal	present	normal	normal	6\12	normal	present	normal	FR+	PRESENT	
148	48	2947191	Sonabai	65	F	LE	DOV	PL+Praccurat e	clear			SMC	22.34	22.56	Cataractous	normal	Normal	normal	present	normal	normal	6\9	normal	present	normal	FR+	PRESENT	
149	49	2947193	Shobha	71	F	RE	DOV	PL+ve PR accurate				SMC	22.45	22.43	Cataractous	normal	Normal	normal	present	normal	normal	6\12	normal	present	normal	FR+	PRESENT	
150	50	2947194	Laxmibai	60	F	RE	DOV	HM+ve	clear			SMC	23.44	23.22	Cataractous	normal	Normal	normal	present	normal	normal	6\18	normal	present	normal	FR+	PRESENT	
151	51	2947196	Nilavva Patil	70	F	RE	DOV	PL+Praccurat e				SMC	22.56	22.34	Cataractous	normal	Normal	normal	present	normal	normal	6\12	normal	present	normal	fr dull	PRESENT	
152	52	2945732	Neelavva	60	F	LE	DOV	PL+ve PR accurate	clear			SMC	22.34	21.78	Cataractous	normal	Normal	normal	present	normal	normal	6\6	normal	present	normal	FR+	PRESENT	
153	53	2943575	Sidappa Patil	65	M	RE	D0V	PL+Praccurat e	clear			SMC	22.34	22.45	Cataractous	normal	Normal	normal	present	normal	normal	6\9	normal	present	normal	fr dull	PRESENT	
154	54	2945534	Gangawwa Beijani	60	F	RE	DOV	PL+ve PR accurate				SMC	23.23	23.46	Cataractous	Normal	Normal	normal	present	normal	normal	6\36	normal	present	normal	fr dull	PRESENT	
155	55	2945634	Kashawwa Bhadrashet ti	50	F	LE	DOV	PL+ve PR accurate	clear			SMC	22.45	22.45	Cataractous	Normal	Normal	normal	present	normal	normal	6\18	normal	present	normal	fr dull	PRESENT	
156	56	2945326	Shamlavva Chalavva	58	F	RE	DOV	PL+Praccurat e	clear			SMC	22.34	22.34	Cataractous	normal	Normal	normal	present	normal	normal	6\24	normal	present	normal	fr dull	PRESENT	
157	57	3668705	Sadashiv Kitagule	60	M	LE	DOV	HM+ve	Leuco.Opaci ty			SMC	23.23	23.27	Cataractous	normal	Normal	normal	present	normal	normal	6\36	normal	present	normal	FR+	PRESENT	
158	58	3670145	Kallappa	55	M	RE	DOV	HM+ve	clear			smc	22.45	22.34	Cataractous	Normal	normal	normal	present	Normal	normal	6\9	normal	present	normal	fr dull	PRESENT	
159	59	3604403	Jakir	55	M	LE	DOV	CF CF				Blue Dot Cataract	22.45	22.45	Cataractous	Normal	NORMAL	normal	present	normal	normal	6\9	normal	present	RD	fr dull	PRESENT	
160	60	3669315	Parvati	60	F	LE	DOV	PL+Praccurat e	OPACITY			SMC	22.34	22.45	Cataractous	normal	Normal	normal	present	normal	normal	6\24	normal	present	normal	FR+	PRESENT	
161	61	3671614	Kashavva	63	F	RE	DOV	CFCF		COLOBOMA		SMC	22.45	22.34	Cataractous	normal	Normal	normal	present	normal	normal	6\60	Normal	present	normal	fr dull	DISK COLOBOMA	
162	62	367322	Devamma Madiger	50	F	LE	DOV	HM+ve				smc	22.34	22.56	Cataractous	normal	normal	normal	present	normal	normal	6\9	normal	present	normal	fr dull	PRESENT	
163	63	3678433	Shivaji Shinde	75	M	LE	DOV	PL+Praccurat e				SMC	22.56	22.34	Cataractous	VIT.OPACITY	Normal	normal	present	normal	normal	6\36	VIT.OPACITY	present	normal	fr dull	PRESENT	
164	64	3675543	Mahadev Chougule	50	M	RE	DOV	HM+ve	clear			smc	22.45	22.45	Cataractous	normal	Normal	normal	present	normal	normal	6\12	normal	present	normal	fr dull	PRESENT	
165	65	3678229	Maruti	60	M	LE	DOV	HM+ve	clear			SMC	23.23	23.32	Cataractous	PVD	Normal	normal	present	normal	normal	6\12	VIT. PATHOLO	present	normal	fr dull	PRESENT	
166	66	3673074	Rayappa Madiger	76	M	LE	DOV	PL+Praccurat e	clear			SMC	22.12	22.34	Cataractous	Normal	Normal	normal	present	normal	normal	6\24	normal	present	normal	FR DULL	PRESENT	
167	67	706594	Mallawwa Talawar	55	F	RE	DOV	HM+ve	clear			SMC	22.56	22.34	Cataractous	normal	Normal	normal	present	normal	normal	6\12	normal	present	normal	FR+	PRESENT	
168	68	706661	Shobha	65	F	LE	DOV	HM+ve	clear			SMC	23.76	23.32	Cataractous	Normal	Normal	normal	present	normal	normal	6\36	normal	present	normal	fr dull	PRESENT	
169	69	3691123	Shivlingap pa	63	M	RE	DOV	CF-CF	clear			SMC	22.56	22.23	Cataractous	normal	Normal	normal	present	normal	normal	6\36	normal	present	normal	fr dull	PRESENT	
170	70	3476555	Dharrappa Monibai	30	M	RE	DOV	PL+Praccurat e	clear			PSMC	22.34	22.34	Cataractous	normal	Normal	normal	present	normal	normal	6\9	normal	present	normal	fr dull	PRESENT	

171	71	3691287	Mahadev	41	M	RE	DOV	PL+Praccurate	clear			Psmc	23.23	23.43	Cataractous	PVD	normal	normal	present	normal	normal	6\9	VIT. PATHOLO	present	normal	fr dull	PRESENT
172		3692652	Kumar Pandurang	65	M	RE	DOV	PL+Praccurate	clear			SMC	22.34	22.34	Cataractous	Normal	Normal	normal	present	normal	normal	6\36	normal	present	normal	FRDULL	PRESENT
173		3692633	Chandrabai	55	F	RE	DOV	PL+ve PR accurate				smc	22.34	22.43	Cataractous	normal	Normal	normal	present	normal	normal	6\24	normal	present	normal	fr dull	PRESENT
174		3694564	Sundra	60	F	RE	DOV	HM+ve				SMC	22.12	22.34	Cataractous	normal	Normal	normal	present	normal	normal	6\6	normal	present	normal	fr dull	PRESENT
175		3696543	Manjula Patil	60	F	RE	DOV	HM+ve	clear			SMC	22.34	22.34	Cataractous	normal	Normal	normal	present	normal	normal	6\9	normal	present	normal	fr dull	PRESENT
176		3697657	Parashuram Bhosle	58	M	RE	DOV	PL+ve PR accurate				SMC	23.23	23.54	Cataractous	normal	Normal	normal	present	normal	normal	6\9	normal	present	normal	fr dull	PRESENT
177		3695857	Jijabai Patil	75	F	RE	DOV	PL+Praccurate	CLEAR			SMC	22.34	22.34	Cataractous	normal	Normal	normal	present	normal	normal	6\12	normal	present	normal	fr dull	PRESENT
178		3699794	Madhukar	52	M	RE	DOV	HM+ve	clear			smc	23.23	23.43	Cataractous	Normal	Normal	normal	present	normal	Normal	6\24	normal	present	normal	fr dull	PRESENT
179		3700277	Annapurna	71	F	RE	DOV	PL+Praccurate	clear			BROWN CAT.	22.87	23.22	Cataractous	Normal	Normal	normal	present	normal	normal	6\24	normal	present	normal	fr dull	PRESENT
180		3482190	Kenchappa	70	M	LE	DOV	CFCF	clear			SMC	22.23	22.45	Cataractous	normal	Normal	normal	present	normal	normal	6\12	normal	present	normal	fr dull	PRESENT
181		3482191	Mallawwa	60	F	LE	DOV	cfcf	clear			SMC	22.43	22.34	Cataractous	VIT.OPACITY	Normal	normal	present	normal	normal	6\24	VIT.H	present	normal	fr dull	PRESENT
182		3482193	Chandrashekhar	56	M	RE	DOV	PL+Praccurate	clear			smc	22.32	22.34	Cataractous	VIT.OPACITY	Normal	normal	present	normal	normal	6\36	DEGENERATIO	present	normal	FR DULL	PRESENT
183		3482194	Mallasheppa	60	M	LE	DOV	HM+ve	CLEAR			smc	22.34	22.34	Cataractous	normal	Normal	normal	present	normal	normal	6\12	normal	present	normal	FR+	PRESENT
184		3692633	Chandrabai	60	F	LE	DOV	PL+ve PR accurate	clear			SMC	22.34	22.23	Cataractous	VIT.OPACITY	Normal	normal	present	normal	normal	6\24	EXUDATES	present	normal	fr dull	PRESENT
185		3696432	Mahadev	60	M	RE	DOV	HM+ve	clear			SMC	22.34	22.45	Cataractous	normal	Normal	normal	present	normal	normal	6\9	normal	present	normal	FR+	PRESENT
186		3696501	Sharu Shinde	60	F	LE	DOV	PL+Praccurate	clear			SMC	22.34	22.54	Cataractous	normal	Normal	normal	present	normal	normal	6\6	normal	present	normal	FR+	PRESENT
187		3706015	Kashavva	60	F	RE	DOV	PL+ve PR accurate	clear			SMC	22.45	22.34	Cataractous	VIT.OPACITY	Normal	normal	present	normal	normal	6\36	EXUDATES	present	normal	fr dull	PRESENT
188		3706016	Chanabasappa	73	M	RE	DOV	PL+ve PR accurate	clear			SMC	22.34	22.34	Cataractous	normal	Normal	normal	present	normal	normal	6\24	normal	present	normal	fr dull	PRESENT
189		3706019	Nagavva Barmur	60	F	RE	DOV	PL+ve PR accurate	clear			SMC	22.34	22.45	Cataractous	normal	Normal	normal	present	normal	normal	6\9	normal	present	normal	FR+	PRESENT
190		3706021	Babasab Attar	60	M	LE	DOV	HM+ve	clear			smc	22.22	22.34	Cataractous	normal	Normal	normal	present	normal	normal	6\12	normal	present	normal	FR+	PRESENT
191		3706022	Dharmavva	60	F	RE	DOV	HM+ve				SMC	22.86	23.32	Cataractous	normal	Normal	normal	present	normal	normal	6\12	normal	present	normal	fr dull	PRESENT
192		3706023	Shivasappa	67	M	RE	DOV	HM+ve	clear			SMC	23.23	23.27	Cataractous	Normal	normal	normal	present	normal	normal	6\12	normal	present	normal	fr dull	PRESENT
193		3706024	Yallappa	50	M	LE	DOV	PL+Praccurate	CLEAR			SMC	22.22	22.34	Cataractous	normal	Normal	normal	present	normal	normal	6\12	normal	present	normal	FR+	PRESENT
194		718650	Mangalla	77	F	RE	DOV	PL+ve PR accurate	CLEAR			smc	23.23	23.34	Cataractous	VIT.OPACITY	Normal	normal	present	normal	normal	6\36	vit.h	present	normal	fr dull	PRESENT
195		3709668	Gangamma Kalol	75	F	LE	DOV	HM+ve	clear			SMC	22.34	22.34	Cataractous	NORMAL	Normal	normal	present	normal	normal	6\12	normal	present	normal	fr dull	PRESENT
196		3120170	Rajeshwari chavva	60	F	LE	DOV	CFCF	clear			SMC	22.76	22.65	Cataractous	normal	Normal	normal	present	normal	normal	6\24	normal	present	normal	FR+	PRESENT
197		2787774	Basayya Pujri	70	M	RE	DOV	cfcf	clear			SMC	22.68	22.76	Cataractous	normal	Normal	normal	present	normal	normal	6\9	normal	present	normal	FR+	PRESENT
198		3541912	Jagadish patil	45	M	LE	DOV	PL+Praccurate	clear			SMC	22.34	22.65	Cataractous	normal	RD	DETACHMENT	present	normal	normal						
199		3719394	Bharat Jakamevar	40	M	LE	DOV	CFCF	clear			SMC	22.23	22.34	Cataractous	normal	Normal	DETACHMENT	present	normal	normal	6\60	normal	present	normal	fr dull	PRESENT
200		3618736	Basappa	65	M	RE	DOV	PL+Praccurate	clear			SMC	23.32	23.32	Cataractous	normal	Normal	normal	present	BUCKLE	normal	6\60	normal	present	normal	fr dull	PRESENT
201		3734278	Nagappa Kamate	70	M	LE	DOV	HM+ve	clear			SMC	22.46	22.34	Cataractous	normal	Normal	normal	present	normal	normal	6\9	normal	present	normal	FR+	PRESENT
202		3736849	Shivaji Khanadole	65	M	LE	DOV	PL+Praccurate	clear			Smc	23.46	23.54	Cataractous	normal	Normal	normal	present	normal	normal	6\12	normal	present	normal	fr dull	PRESENT
203		3747140	Havasabai Satu	65	F	RE	DOV	CF CF				SMC	23.23	23.32	Cataractous	NORMAL	Normal	normal	present	normal	normal	6\60	normal	present	normal	fr dull	PRESENT
204		3689838	Masanu Naik	65	M	RE	DOV	CFCF	clear			SMC	23.34	23.43	Cataractous	VIT.OPACITY	Normal	normal	present	normal	normal	CF 3M	VIT.H	present	normal	DNMO	PRESENT
205		756532	Rukmini	60	F	LE	DOV	PL+ve PR accurate	clear			SMC	22.34	22.34	Cataractous	normal	Normal	normal	present	normal	normal	6\12	normal	present	normal	FR+	PRESENT
206		716115	Shankar	65	M	LE	DOV	HM+ve				SMC	22.43	22.43	Cataractous	normal	Normal	normal	present	normal	normal	6\9	normal	present	normal	FR+	PRESENT
207		3758338	Suresh	60	M	LE	DOV	PL+ve PR accurate	clear			SMC	23.23	23.12	Cataractous	normal	Normal	normal	present	normal	normal	6\12	normal	present	normal	fr dull	PRESENT
208		3758455	Narsappa	50	M	RE	DOV	PL+ve PR accurate	clear			smc	22.23	22.34	Cataractous	PVD	NORMAL	normal	present	normal	normal	6\12	normal	present	normal	fr dull	PRESENT
209		376072	Sonabai Koravi	65	F	RE	DOV	CFCF	clear			SMC	22.23	22.34	Cataractous	NORMAL	NORMAL	normal	present	normal	normal	6\12	normal	present	normal	fr dull	PRESENT

210		3761658	Vani Bandekar	20	F	LE	DOV	CFCF	clear			PSMC	22.23	22.23	Cataractous	normal	Normal	normal	present	normal	normal	6\12	normal	present	normal	FR+	PRESENT
211		717344	Hanumanth	10/m	M	RE	DOV	CFCF	clear			Congenital cat.			Cataractous	normal	Normal	normal	present	normal	normal		Normal	present	normal	FR+	PRESENT
212		712894	Anusuya Somaling	60	F	RE	DOV	HM+ve				SMC	22.23	22.34	Cataractous	normal	Normal	normal	present	normal	normal	6\12	normal	present	normal	fr dull	PRESENT
213		3768953	Dattu Bhadange	58	M	RE	DOV	PL+ve PR accurate	clear			smc	22.23	22.34	Cataractous	normal	Normal	normal	present	normal	normal	6\36	normal	present	normal	fr dull	PRESENT
214		3772750	Pratap Patil	55	M	LE	DOV	HM+ve	CLEAR			SMC	22.34	22.12	Cataractous	normal	Normal	normal	present	normal	normal	6\12	normal	present	normal	FR+	PRESENT
215		3769539	Arjun Ash	60	M	RE	DOV	PL+Praccurate				SMC	22.23	22.34	Cataractous	VIT.OPACITY	Normal	normal	present	normal	normal	6\60	V.H	FAINT	normal	fr dull	PRESENT
216		3733181	Mahadev	60	F	LE	DOV	HM+ve				SMC	22.34	22.23	Cataractous	NORMAL	Normal	normal	present	normal	normal	6\18	normal	present	normal	fr dull	PRESENT
217		3775663	Bhimrayy	55	M	LE	DOV	PL+Praccurate				SMC	23.23	23.43	Cataractous	NORMAL	Normal	normal	present	normal	normal	6\12	normal	present	normal	fr dull	PRESENT
218		718605	Dilip Kum	68	M	RE	DOV	PL+Praccurate				SMC	22.23	22.45	Cataractous	normal	Normal	normal	present	normal	normal	6\24	normal	present	normal	fr dull	PRESENT
219		3780236	Suvarna	40	F	RE	DOV	CFCF				PSMC	22.23	22.34	Cataractous	normal	Normal	normal	present	normal	normal	6\9	normal	present	normal	FR+	PRESENT
220		3781925	Abdul Mu	60	M	RE	DOV	CFCF				SMC	22.23	22.45	Cataractous	normal	Normal	normal	present	normal	normal	6\12	normal	present	normal	FR+	PRESENT
221		3783273	Irawwa P	70	F	LE	DOV	PL+Praccurate				SMC	22.12	22.65	Cataractous	normal	Normal	normal	present	normal	normal	6\24	normal	present	normal	fr dull	PRESENT
222		2871045	Pandappa	60	M	RE	DOV	PL+Praccurate				HMC	23.23	23.43	Cataractous	normal	Normal	normal	present	normal	normal	6\9	normal	present	normal	fr dull	PRESENT
223		3785077	Laxmibai	75	F	RE	DOV	CFCF				SMC	22.23	22.34	Cataractous	normal	Normal	normal	present	normal	normal	6\9	normal	present	normal	FR+	PRESENT
224		3470807	Narayan	40	M	LE	DOV	HM+ve				PSMC	22.23	22.54	Cataractous	normal	Normal	normal	present	normal	normal	6\12	normal	present	normal	fr dull	PRESENT
225		720321	Basawwa	55	F	LE	DOV	PL+Praccurate				SMC	22.23	22.6	Cataractous	PVD	Normal	normal	present	normal	normal	6\60	normal	present	normal	fr dull	PRESENT
226		3797143	Yallappa	74	M	LE	DOV	HM+ve				SMC	22.33	22.45	Cataractous	PVD	Normal	normal	present	normal	normal	6\60	VIT.H	present	normal	DNMO	PRESENT
227		722049	Durgaww	70	F	RE	DOV	PL+Praccurate				SMC	22.32	22.34	Cataractous	normal	Normal	normal	present	normal	normal	6\12	normal	present	normal	FR+	PRESENT
228		722074	Kamalaw	60	F	LE	DOV	HM+ve				SMC	22.56	22.45	Cataractous	normal	Normal	normal	present	normal	normal	6\9	normal	present	normal	FR+	PRESENT
229		722059	Mahadev	60	F	LE	DOV	CFCF				SMC	22.54	22.45	Cataractous	normal	Normal	normal	present	normal	normal	6\12	normal	present	normal	fr dull	PRESENT
230		722058	Ningaww	60	F	LE	DOV	CFCF				SMC	22.34	22.54	Cataractous	NORMAL	NORMAL	normal	present	normal	normal	6\12	normal	present	normal	fr dull	PRESENT
231		722045	Demavva	60	F	RE	DOV	HM+ve				SMC	23.34	23.11	Cataractous	NORMAL	NORMAL	normal	present	normal	normal	6\12	normal	present	normal	fr dull	PRESENT
232		722052	Tangeww	60	F	LE	DOV	PL+Praccurate				SMC	22.23	22.45	Cataractous	normal	Normal	normal	present	normal	normal	6\12	normal	present	normal	FR+	PRESENT
233		722062	Kamalaw	70	F	RE	DOV	HM+ve				SMC	22.23	22.45	Cataractous	PVD	Normal	normal	present	normal	normal	6\24	Normal	present	normal	fr dull	PRESENT
234		712345	Kasturi Ya	60	F	LE	DOV	PL+Praccurate				SMC	22.23	22.34	Cataractous	normal	Normal	normal	present	normal	normal	6\12	normal	present	normal	fr dull	PRESENT
235		3800663	Anita Pat	35	F	RE	DOV	HM+ve				PSMC	22.56	22.67	Cataractous	normal	Normal	normal	present	normal	normal	6\12	normal	present	normal	fr+	PRESENT
236		3803653	Krishnavv	58	M	RE	DOV	PL+Praccurate				SMC	22.56	22.43	Cataractous	PVD	Normal	normal	present	normal	normal	6\12	normal	present	normal	fr dull	PRESENT
237		3806691	Sutar Pur	55	M	RE	DOV	CFCF				SMC	22.45	22.45	Cataractous	Normal	Normal	normal	present	normal	normal	6\24	normal	present	normal	fr dull	PRESENT
238		724089	Daregouc	60	M	RE	DOV	HM+ve				SMC	22.34	22.45	Cataractous	PVD	Normal	normal	present	normal	normal	6\18	normal	present	normal	fr dull	PRESENT
239		3815214	Laxmi	65	F	RE	DOV	HM+ve				SMC	22.23	22.6	Cataractous	NORMAL	Normal	normal	present	normal	normal	6\24	normal	present	normal	fr dull	PRESENT
240		724084	Ramu	60	M	RE	DOV	CFCF				SMC	22.33	22.45	Cataractous	PVD	Normal	normal	present	normal	normal	6\60	normal	present	normal	DNMO	PRESENT
241		3831148	Amogh	65	M	RE	DOV	HM+ve				SMC	22.32	22.34	Cataractous	normal	Normal	normal	present	normal	normal	6\12	normal	present	normal	FR+	PRESENT
242		3831152	Shankrep	70	M	LE	DOV	CFCF				SMC	22.56	22.45	Cataractous	normal	Normal	normal	present	normal	normal	6\9	normal	present	normal	FR+	PRESENT
243		3912446	Kaderadi	60	F	RE	DOV	PL+Praccura	High MYOPIA			SMC	25.54	25.45	Cataractous	normal	Normal	normal	present	normal	normal	6\12	normal	present	normal	fr dull	PRESENT
244		3823553	Balawwa	55	F	LE	DOV	HM+ve				SMC	22.34	22.54	Cataractous	NORMAL	NORMAL	normal	present	normal	normal	6\12	normal	present	normal	fr dull	PRESENT
245		283447	Hanuman	60	M	RE	DOV	CFCF				SMC	23.34	23.11	Cataractous	PVD	NORMAL	normal	present	normal	normal	6\12	normal	present	normal	fr dull	PRESENT
246		3874560	Yallavva	55	F	RE	DOV	CFCF				SMC	22.23	22.45	Cataractous	DEGENERATIO	Normal	normal	present	normal	normal	6\12	normal	present	normal	fr dull	PRESENT
247		734671	Mulla Rab	55	M	RE	DOV	HM+ve				SMC	22.23	22.45	Cataractous	PVD	Normal	normal	present	normal	normal	6\24	Normal	present	normal	fr dull	PRESENT
248		7536663	Dymappa	60	M	LE	DOV	PL+Praccurate				SMC	22.23	22.34	Cataractous	DEGENERATIO	Normal	normal	present	normal	normal	6\12	normal	present	normal	fr dull	PRESENT
249		3887658	Gouravva	80	F	RE	DOV	HM+ve				SMC	22.56	22.67	Cataractous	DEGENERATIO	Normal	normal	present	normal	normal	6\12	normal	present	normal	fr dull	PRESENT
250		3934655	Sumitra D	65	F	LE	DOV	CFCF				SMC WITH LI	22.56	22.43	Cataractous	PVD	Normal	normal	present	normal	normal	6\12	normal	present	normal	fr dull	PRESENT
												SMC	22.45	22.45	Cataractous	Normal	Normal	normal	present	normal	normal	6\24	normal	present	normal	fr dull	PRESENT
												SMC	22.34	22.45	Cataractous	PVD	Normal	normal	present	normal	normal	6\18	normal	present	normal	fr dull	PRESENT

ANNEXURE-V

KEY TO MASTER CHART

CD	Choroidal Detachment
CF	Counting Fingers
DOV	Diminution of Vision
HM	Hand Movements
LE	Left Eye
PCO	Posterior Capsular Opacity
PHPV	Persistent Hyperplastic Primary Vitreous
PL	Perception of Light
PR	Projection of Rays
PVD	Posterior Vitreous Detachment
PSC	Posterior Subcapsular Cataract
PSMC	Presenile Mature Cataract
RD	Retinal Detachment
RE	Right Eye

SHMC	Senile Hypermature Cataract
SIMC	Senile Immature Cataract
SMC	Senile Mature Cataract
TRD	Tractional Retinal Detachment
VA	Visual Acuity
VH	Vitreous Hemorrhage