B-SCAN ULTRASONOGRAPHY

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Learning objectives

- Define B scan?
- Which types of frequencies are used in ophthalmic ultrasound?
- What are the indications of B scan?

INTRODUCTION

- B-scan ultrasonography is an important adjuvant for the clinical assessment of various ocular and orbital diseases.

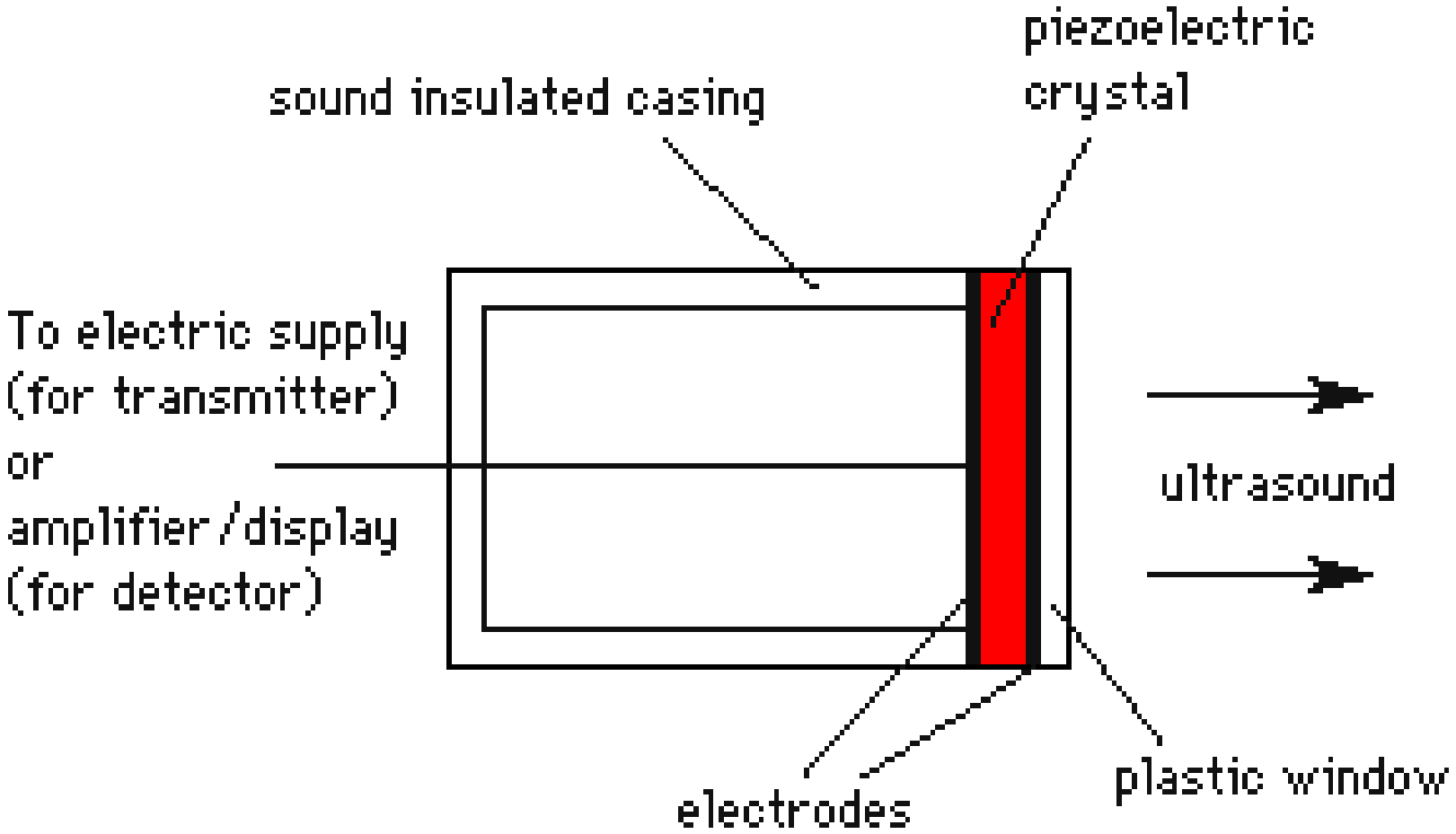
- B- SCAN is a two dimensional imaging system which uses high frequency sound waves ranging from 8-10 MHz.

Physics

- It is an acoustic wave that consists of particles within the medium
- Frequencies used in diagnostic ophthalmic ultrasound are in the range of 8-10 MHz
- These high frequencies produce shorter wave lengths which allow good resolution of minute ocular and orbital structures

- Multiple short pulses are produced with a brief interval that allows the returning echos to be detected, processed and displayed.

- The basis of the echo system is piezoelectric element which is a quartz or ceramic crystal located near the face of the probe


piezoelectric
crystal
sound insulated casing
To electric supply
(for transmitter)
or
amplifier/display
(for detector)
ultrasound
electrodes
plastic window

Types of frequency

- **Low frequency**: orbital tissue

- **Medium frequency** : (7 – 10 mhz)
  Retinal , vitreous , optic nerve

- **High frequency** : (30 – 50 mhz) : anterior chamber up to 5mm

- **DISPLAY MODES**: A SCAN/ B SCAN / BOTH

Examination technique:

The patient is either reclining on a chair or lying on a couch.
The probe can be placed directly over the conjunctiva or lid

Probe positions

- **Transverse** : most common
  - Lateral extent, 6 clock hours
- **Longitudinal** : radial ,1 clock hrs.
  AP diameter in Retinal tumors and tears
- **Axial** : lesion in relation to lens and optic nerve .

Image documentation modes

- They are of 2 types
  - stationary/static
  - moving/dynamic

- The images may be saved in different methods
  - Polaroid photographs
  - 35 mm photo
  - Ink prints
  - Thermal prints
  - Videotapes

Indications

- Anterior segment:

1. Opaque ocular media (i.e. corneal opacities)
   - Pupillary membrane
   - Dislocation / Subluxation lens
   - Cataract / after cataract Posterior capsular tear
   - Pupillary size / reaction

2. Clear ocular media
   - Diagnosis of iris and ciliary body tumors

- Posterior segment:
  1. Opaque ocular media
     - Vitreous haemorrhage
     - Vitreous exudation
     - Retinal detachment (type / extent)
     - Posterior vitreous detachment (extent)
     - Intraocular foreign body (size/ site/ type)

  2. Clear ocular media
     - Tumour (size/ site/ post treatment follow up)
     - Retinal detachment (solid / exudative)
     - Optic disc anomalies
  3. ocular trauma

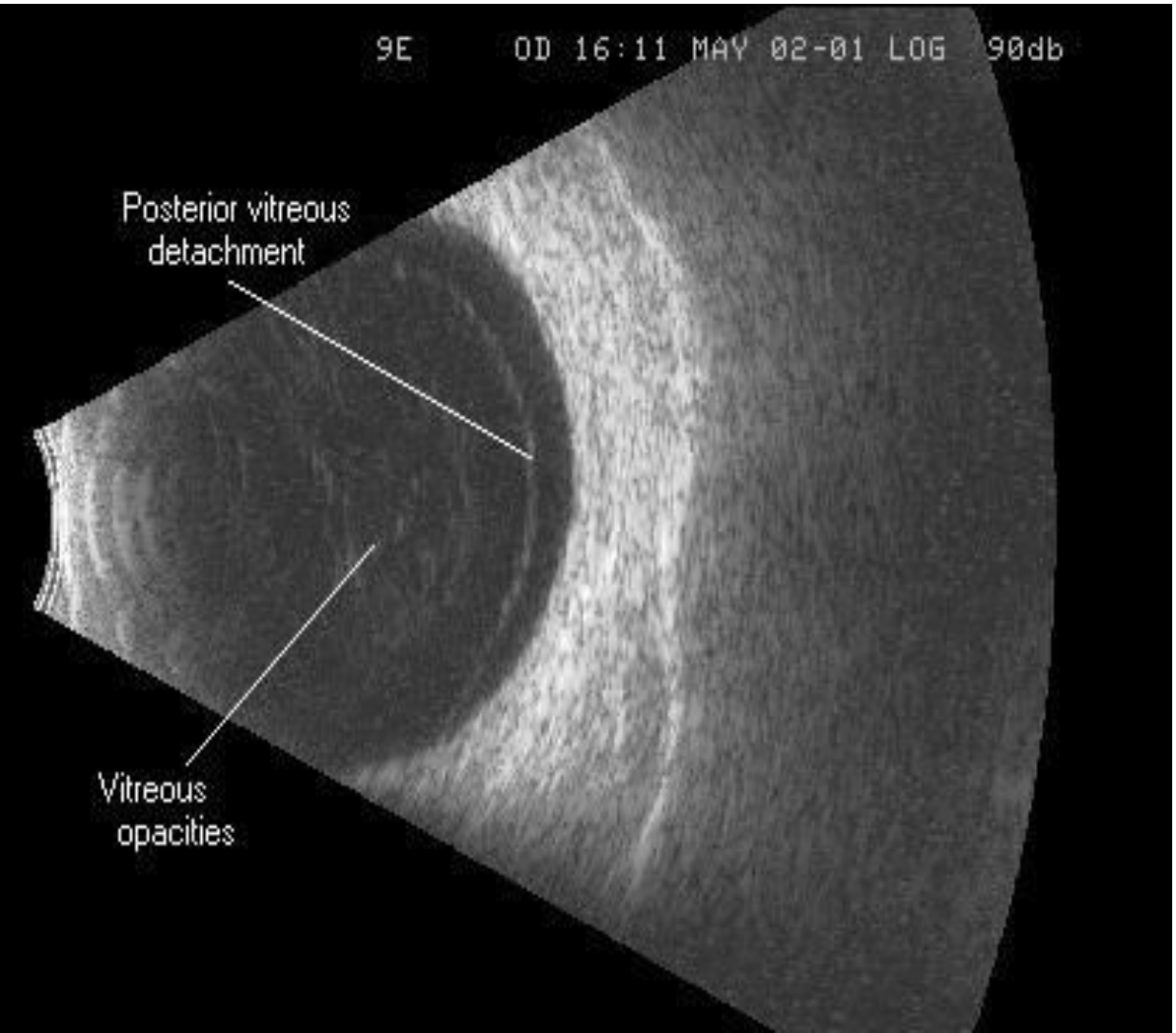
indications of b-scan in pediatric patients

Useful in the following conditions:

- Abnormal size of eye
- Abnormal shape of eye
- Congenital abnormalities
- Vitreous alterations
- Retinal detachments (type/ location)
- Ocular and orbital tumours
- Trauma

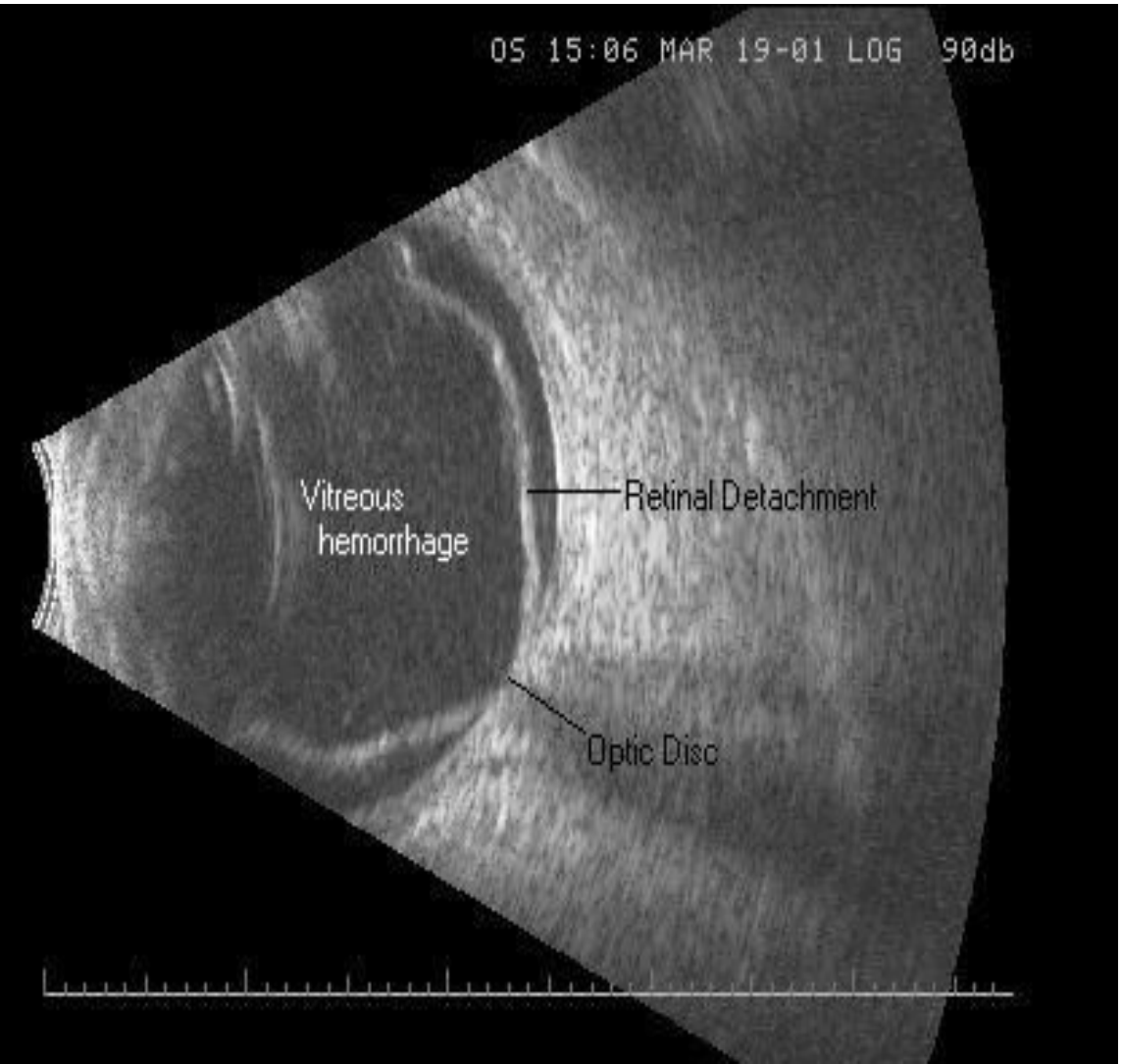
- ULTRASONOGRAPHIC CHARACTERISTICS

POSTERIOR VITREOUS DETACHMENT



Posterior vitreous detachment:
The detached posterior vitreous is seen as membranous lesion with no/some attachments to the optic disc

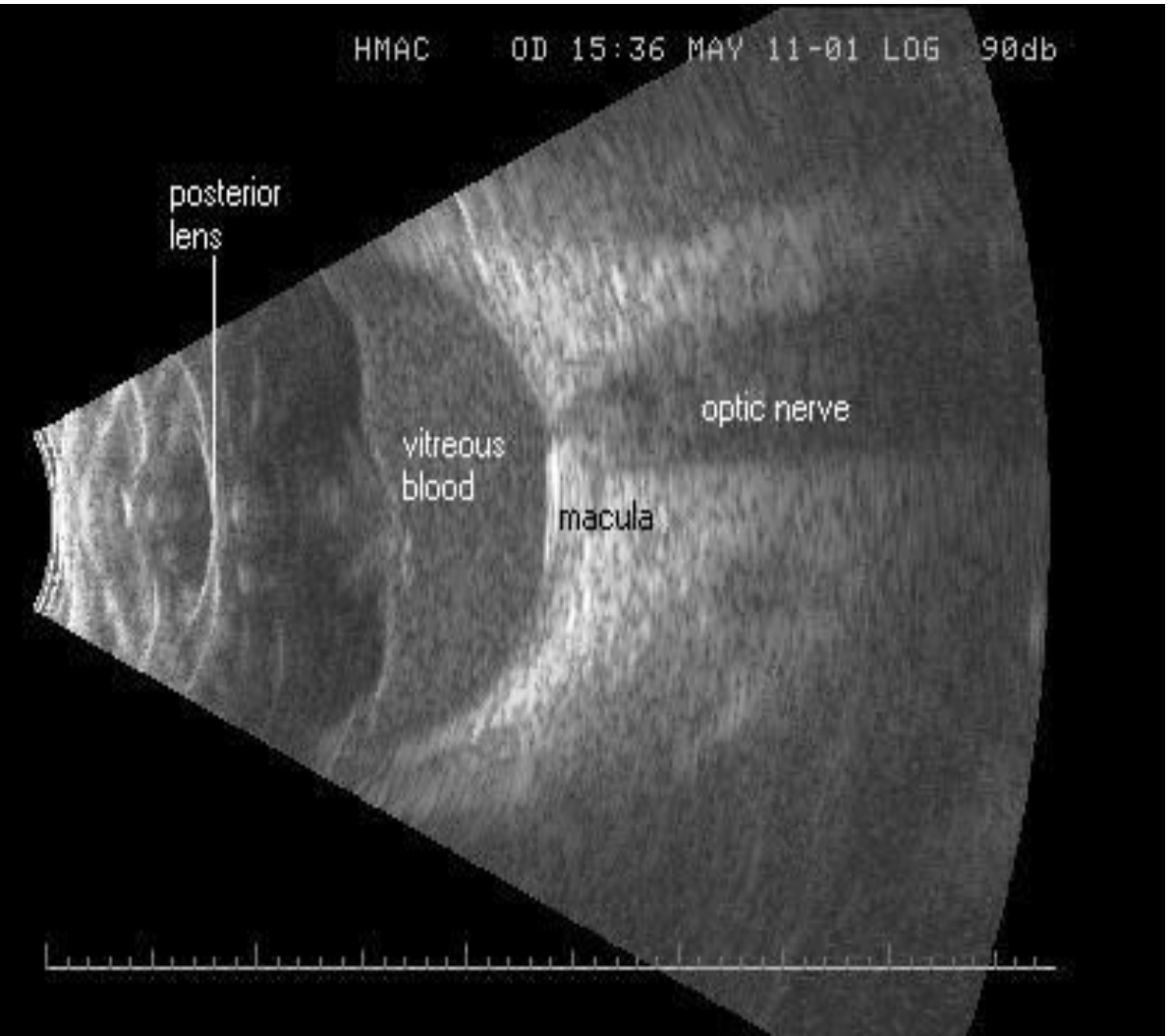
RETINAL DETACHME



The detachment produces a bright continuous, folded appearance with insertion into the disc and ora serrata.

It is to determine the configuration of the detachment as shallow, flat or bullous

VITREOUS HAEMORRHAGE

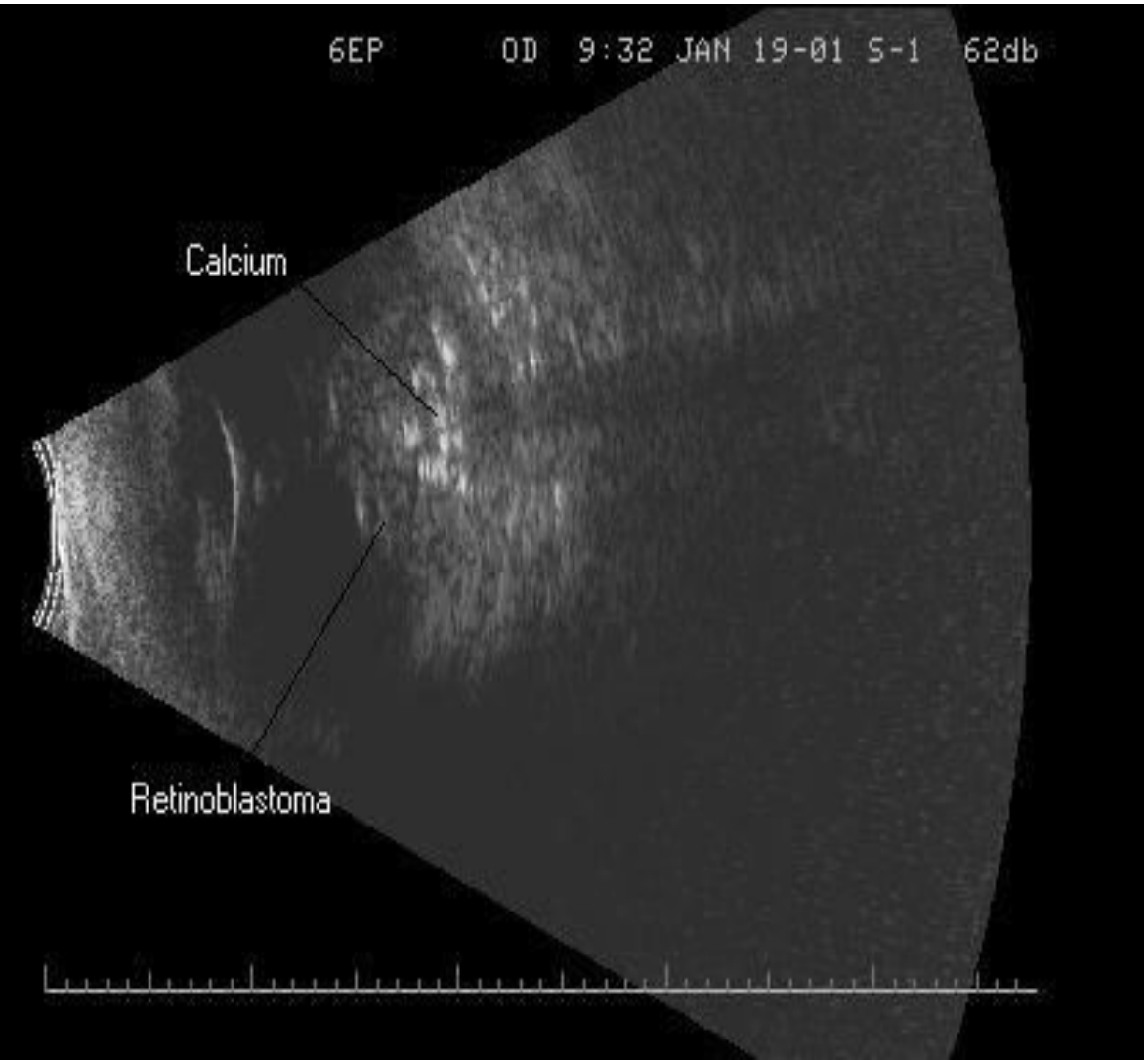


To detect extent, density, location and cause

Fresh haemorrhage shows dots or lines

Old haemorrhage the dots gets brighter

RETINOBLASTOMA

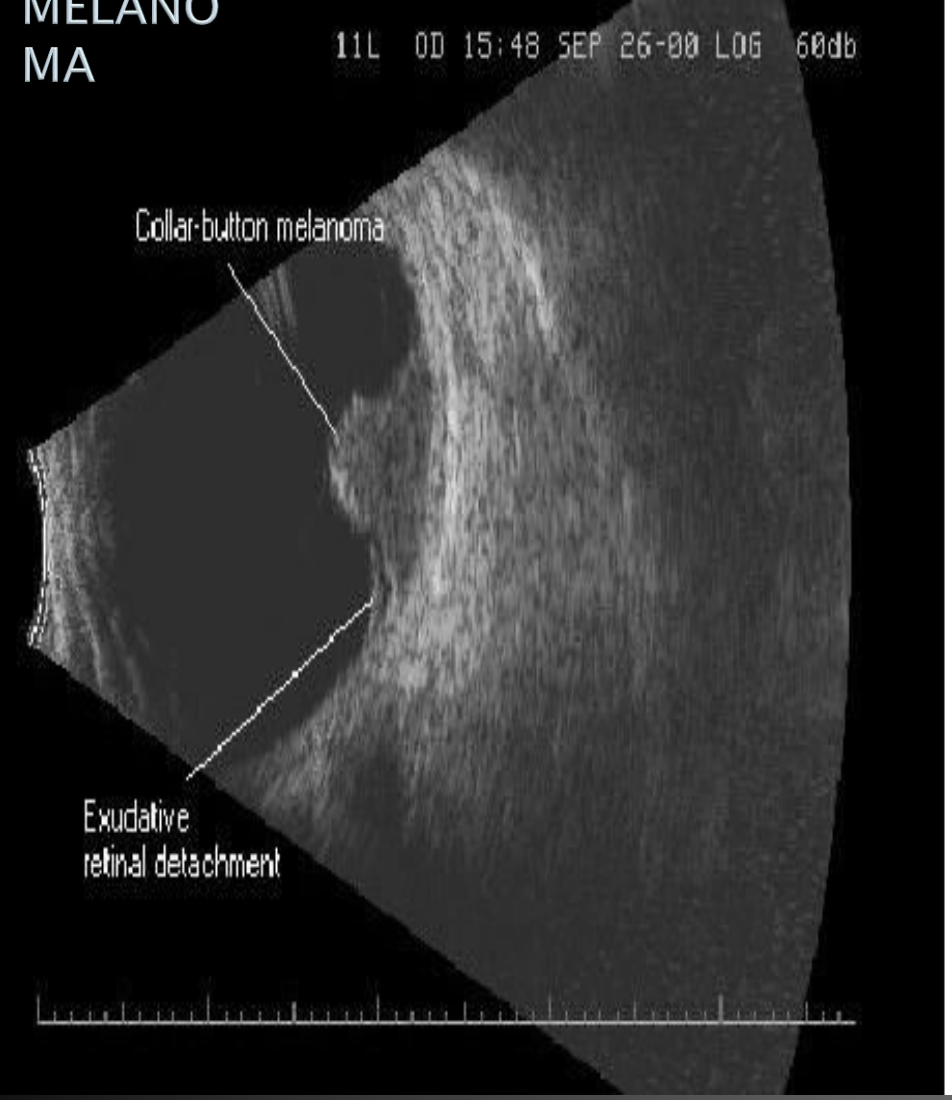


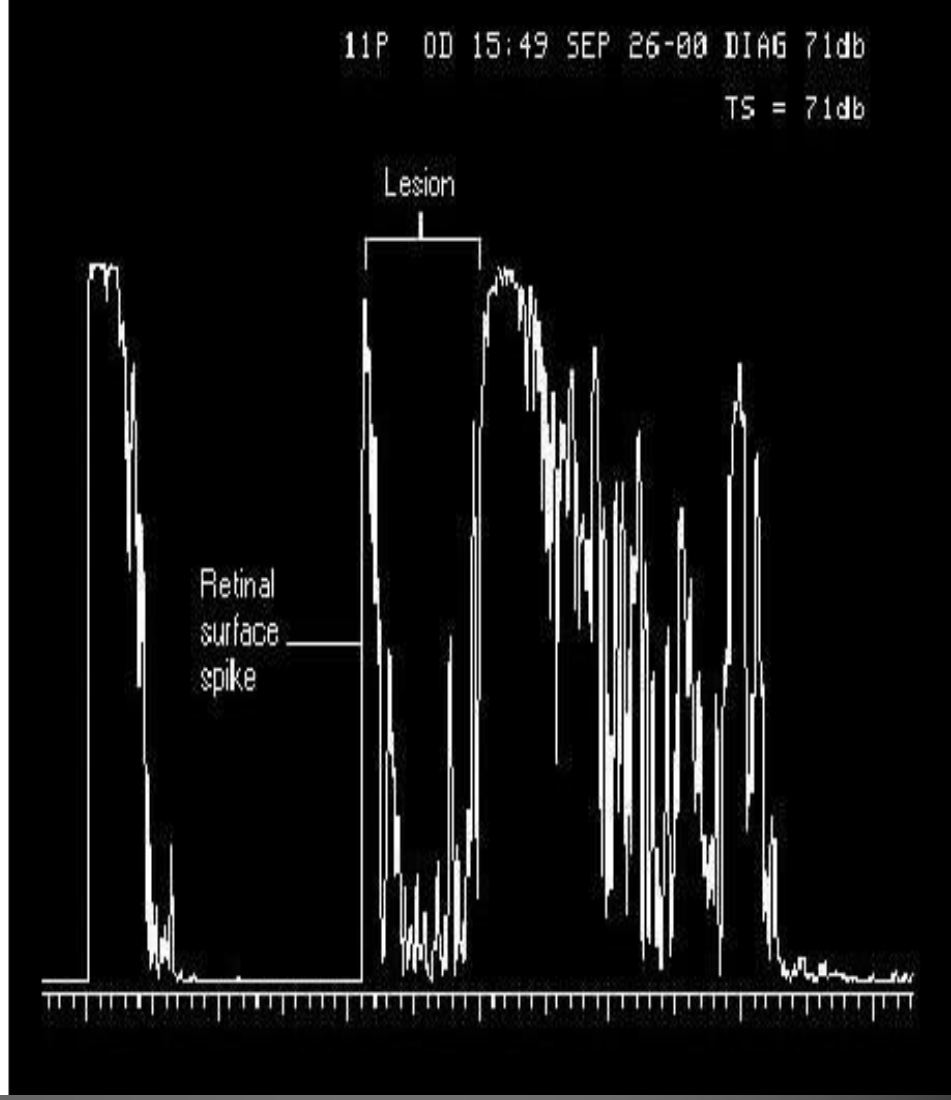
Size of the tumour

Shows irregular configuration

Calcification shows high internal reflectivity

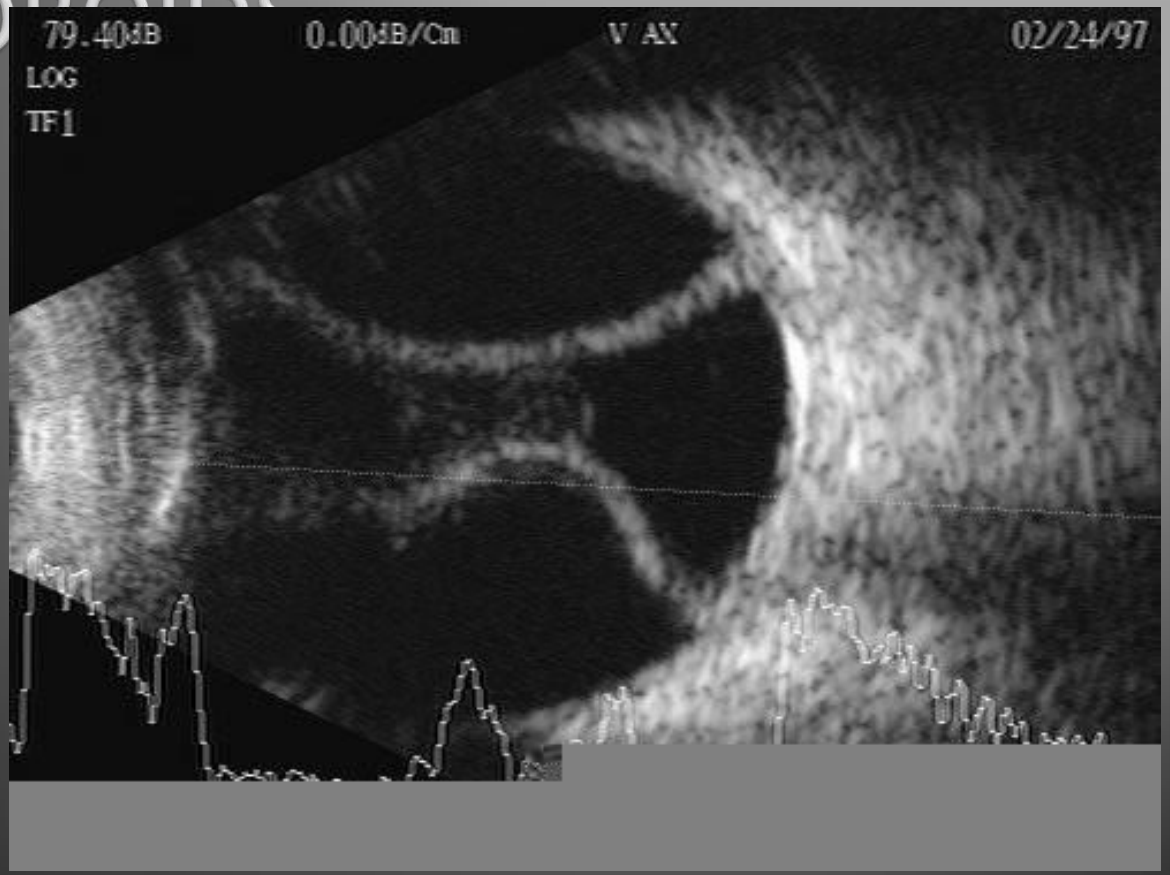
MELANO
MA



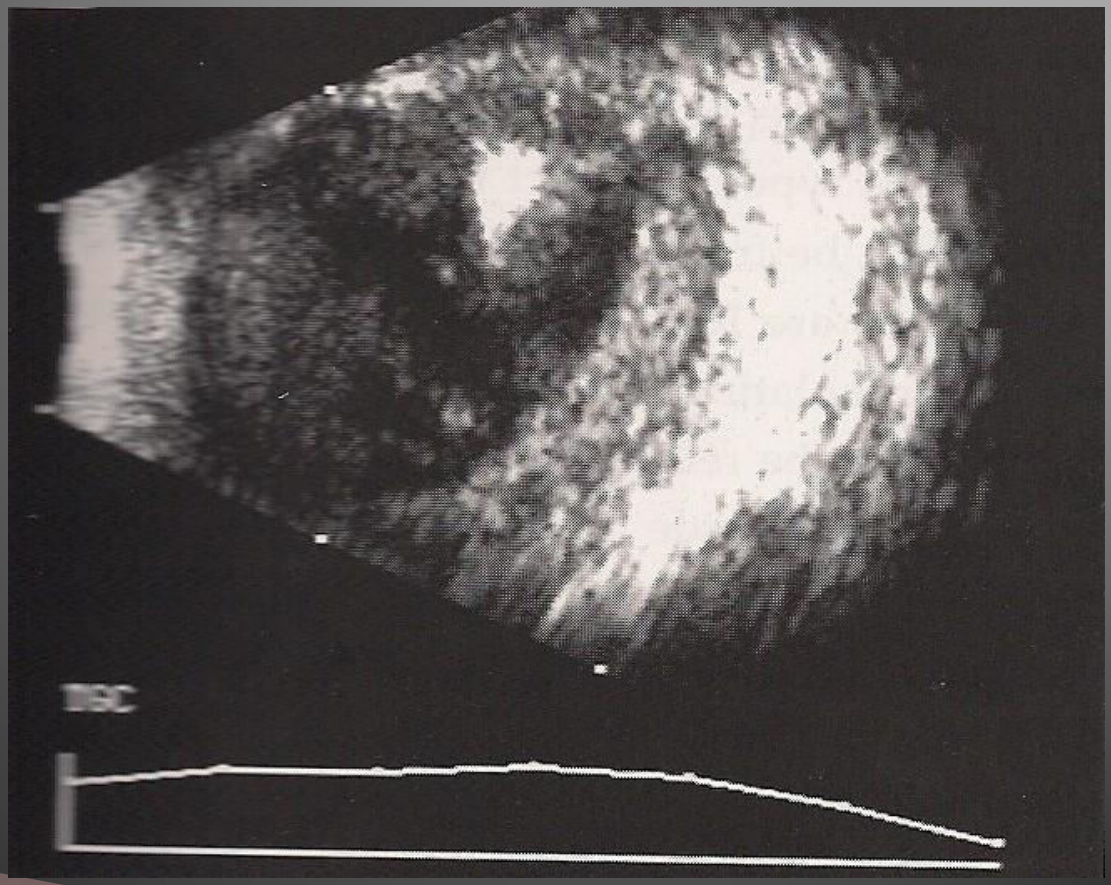


Collar button or mushroom shape.Large tumours shows acoustic hallowing

CHOROIDAL DETACHMENT KISSING CHOROIDS



INTRA OCULAR FOREIGN BODY




THANK YOU