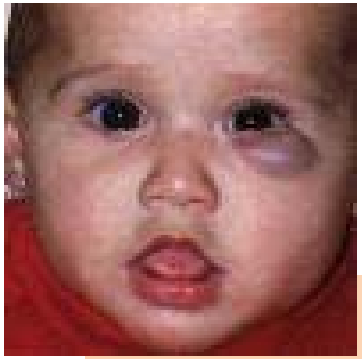

Tumors of the Eye

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Conjunctival tumors

Non-pigmented tumours

I. Congenital: dermoid and lipodermoid (choristomas).

II. Benign: simple granuloma, papilloma, adenoma, fibroma and angiomas.

III. Premalignant: intraepithelial epithelioma (Bowen's disease).

IV. Malignant: epithelioma or squamous cell carcinoma, basal cell carcinoma.

Pigmented tumours

I. Benign: naevi or congenital moles.

II. Precancerous melanosis: superficial spreading melanoma and lentigo maligna (Hutchinson's freckle).

III. Malignant: primary melanoma (malignant melanoma).

Lacrimal Gland Tumors

Benign

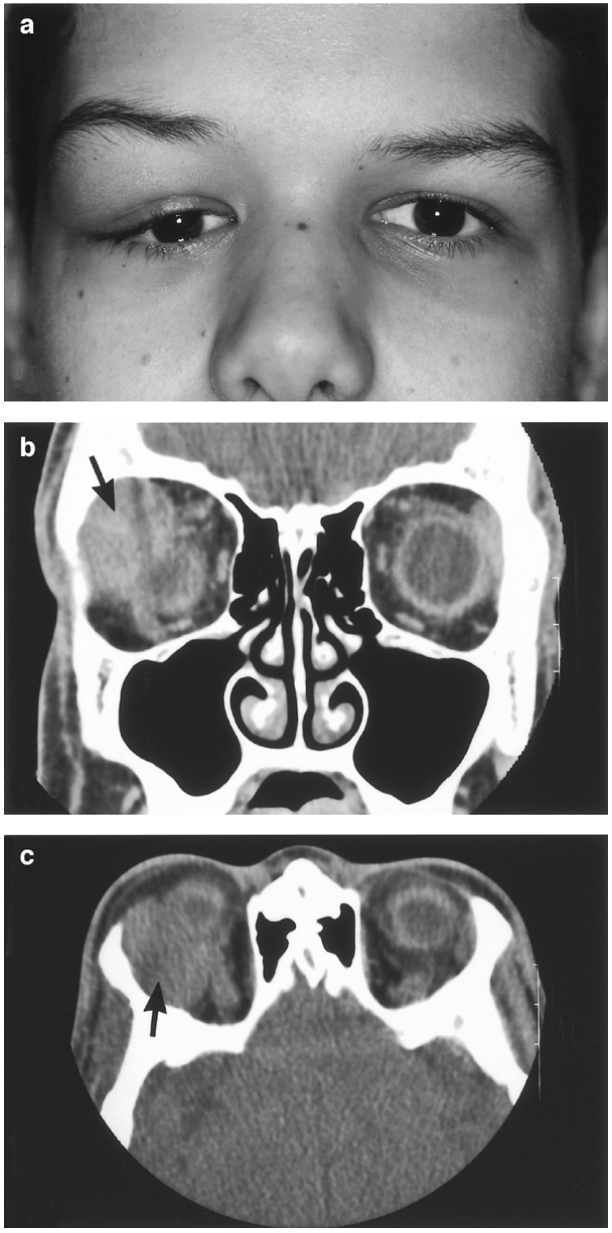
- Pleomorphic adenoma
- Schwannoma
- Dermoid
- Neurofibroma

Malignant

- Adenoid Cystic Carcinoma
- Malignant Mixed Tumour of the Lacrimal Gland
- Adenocarcinoma
- Metastatic Tumor

Pleomorphic adenoma

- Most common epithelial turnor-benign mixed-cell tumor.
- **Presentation-**adult life with painless, smooth, firm non-tender, slowly growing in the upper outer quadrant
- **Examination-** most cases, arising from the orbital portion of the lacrimal gland. CT scan bony excavation of the lacrimal gland fossa.
- **Treatment--** Lateral orbitotomy


a
b
c

Lid Tumors

Benign tumours:

- Simple papilloma
- Naevus
- Angioma
- Haemangioma
- Neurofibroma
- Sebaceous adenoma

Pre-cancerous conditions.

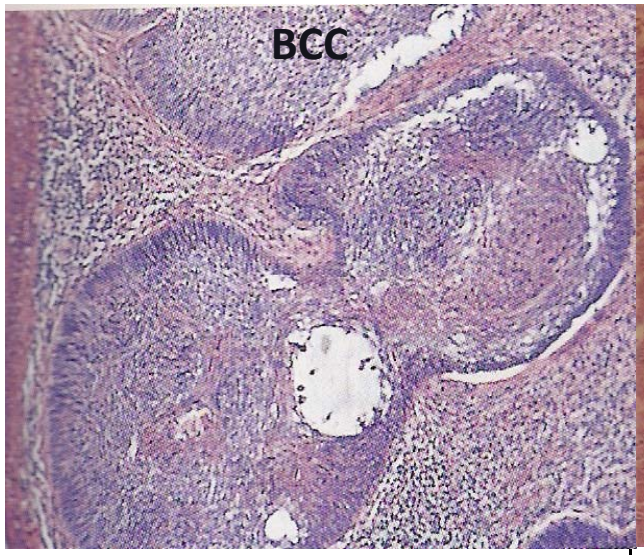
- *Solar* keratosis,
- Carcinoma-in-situ
- xeroderma pigmentosa

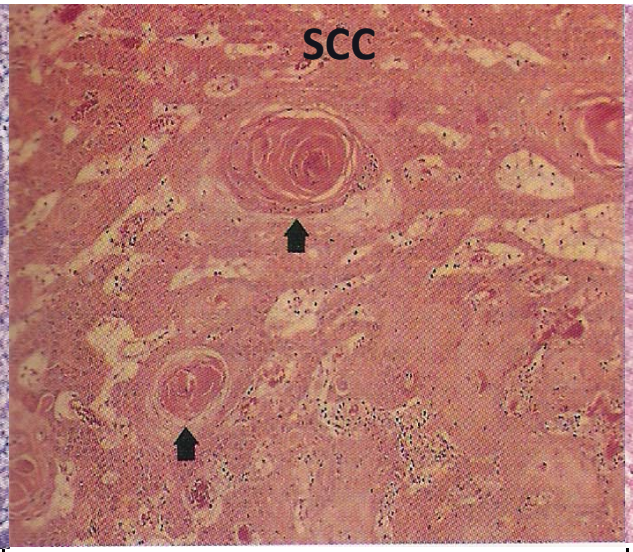
Malignant tumours

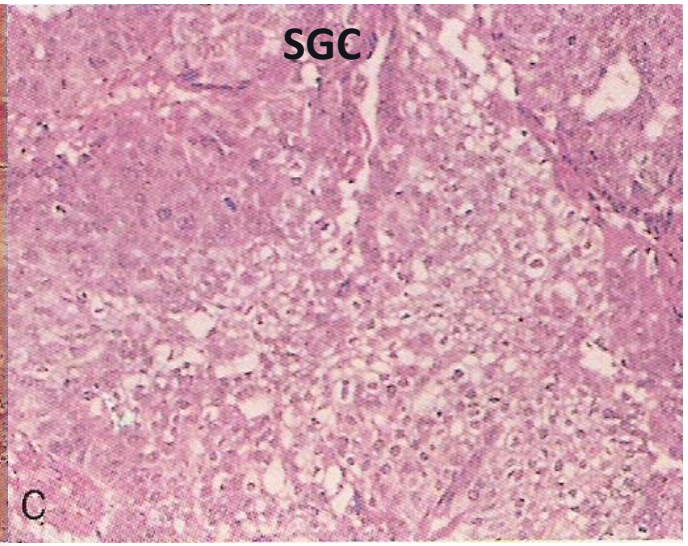
- Squamous cell carcinoma
- Basal cell carcinoma

Nonmelanoma skin cancers account for more than 1/3rd of all cancers;
Basal cell carcinoma (BCC) accounts for 92.5% of all eyelid tumours;
Squamous cell carcinoma (SCC) accounts for 5% and
Sebaceous gland carcinoma (SGC) for around 1%

	BCC	SCC	SGC
Incidence	Most common	2nd most common	Least common
Origin	Basal cells of the epidermis, cells fail to mature and keratinise	Arise from the differentiated cells of the epidermis, mature and keratinise	Arise from the meibomian glands or the glands of Zeis
Site	Lower lid, medial canthus, upper lid and lateral canthus	Lower lid	Upper eyelid
Predisposing factors	UV light	UV light, burn scars, traumatic ulcers,immunocompromised, irradiation	Recurrent chalazion and irradiation







Large nests of hyperchromatic cells (bluish) with scanty cytoplasm, prominent nuclei and inconspicuous nucleoli invading the dermis

Peripheral palisading of the nuclei

Retraction artifacts with telltale clefts

Nodular form commonest

Cystic, adenoid, pigmented and sclerosing variants can

Polygonal cells with abundant eosinophillic cytoplasm, Hyperchromatic and prominent nuclei

Dyskeratotic cells with keratin pearl formation characteristic

Invades dermis

As the degree of invasion increases, the anaplasia increases and the keratinisation decreases

Well demarcated lobules with baseloid features, no peripheral palisading

Eosinophillic sebaceous cells, mitotically active, bizarre nuclei,

Foamy vacuolated cytoplasm(consists of dissolved lipids)

Invades dermis

BCC

Clinical characteristics:

Present as small, firm, upraised nodules with umbilicated or ulcerated centre;

Raised, rolled, pearly translucent margins with fine telangiectasias

Minimally invasive

Management:

•Surgery, Fresh tissue micrographic surgical approach (Moh's surgery)

•Cryosurgery, electrodessication and curettage : small tumors

•Radiotherapy and chemotherapy : Inoperable tumors

•Exenteration : orbital invasion

•PDT with hematoporphyrin derivative

SCC

Clinical characteristics:

Indurated, scaly, elevated plaque,with a punched out ulcerated area with serosanguienous and indurated edges, surface crusting

Highly invasive and metastatic

Management:

•Wide surgical excision with frozen section control and immediate reconstruction

•Moh' s surgery

•Exenteration : orbital invasion

•Radiotherapy and chemotherapy

SGC

Clinical characteristics:

Elderly female with persistent unilateral blepharoconjunctivitis or painless upper lid nodule (recurrent chalazion)

Invasive and metastatic

Management:

•Complete wide surgical excision –treatment of choice

•Preferably with frozen section control or adjunctive radio and chemotherapy

•Exenteration in invasive tumors

Uveal Tract Tumors

TUMOURS OF CHOROID

Benign

- Naevus
- Haemangioma
- Melanocytoma
- Choroidal osteoma

Malignant

- Melanoma

TUMOURS OF CILIARY BODY

Benign

- Hyperplasia
- Benign cyst
- Meduloepithelioma

Malignant

- Melanoma

TUMOURS OF IRIS

Benign

- Naevus
- Benign cyst
- Naevoxanthoendothelioma

Malignant

- Melanoma

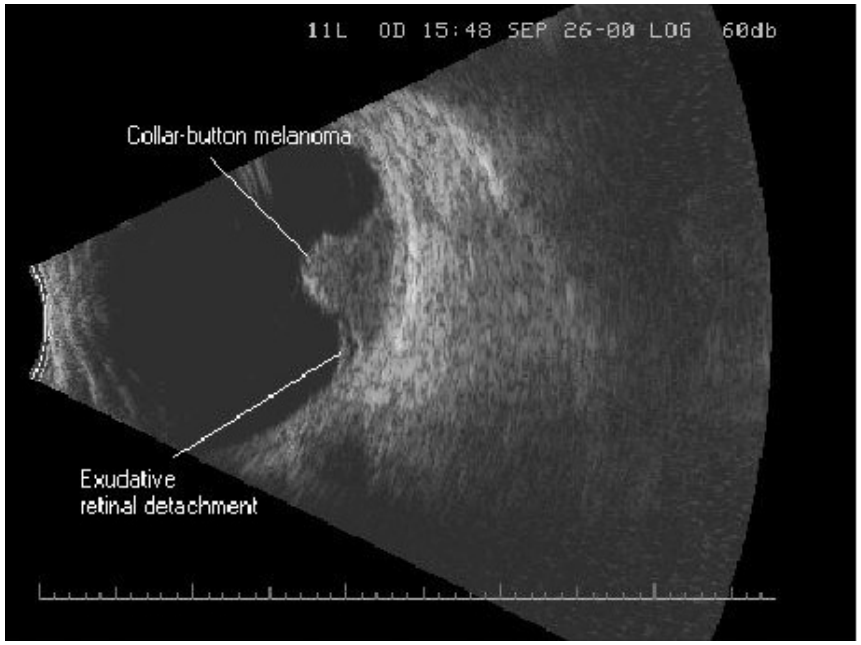
Choroidal Melanoma

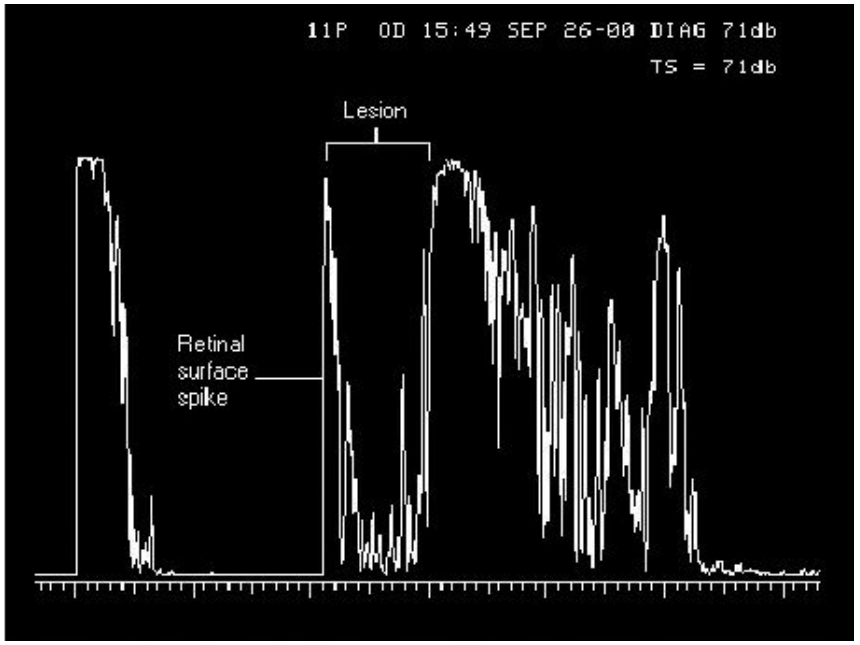
- Typically begins asymptomatic, however, blurred VA, VF loss and flashes/floaters may all be symptoms
- Caucasians, 5th decade
- 2 varieties: circumscribed and diffuse
- Elevated, mottled lesion
- Most melanomas arise from pre-existing, benign choroidal nevi. The prevalence of nevi is 1-2%[5] and the incidence of malignant degeneration into melanoma is less than 1%.

- Exudative retinal detachments are seen with tumors more that 4 mm thick.
- Lipofuscin, an orange pigment, is characteristically seen at the level of the retinal pigment epithelium (RPE).
- Some large melanomas, especially those involving the ciliary body, have prominent episcleral feeder vessels.
- Distant metastasis
- Radiation most common treatment modality
- Enucleation treatment of choice for high risk melanomas

b
c
a

- Combined A-mode and B-mode ultrasonography is the most important ancillary test.
- The classic signs with B-scan:acoustically silent zone within the melanoma, choroidal excavation and acoustic shadowing of the orbit. The A-mode shows medium to low internal reflectivity.


11L OD 15:48 SEP 26-00 LOG 60db
Collar-button melanoma
Exudative
retinal detachment


11P OD 15:49 SEP 26-00 DIAG 71db
TS = 71db
Lesion
Retinal
surface
spike

Tumors of Retina

Primary tumours

Neuroblastic tumours.

- *Sensory* retina (retinoblastoma and astrocytoma)
- Pigment epithelium (benign epithelioma; melanotic malignant tumours).

Mesodermal angiomata

- Cavernous haemangioma

Phakomatoses

- *Angiomatosis* retinae (von hippel-lindau disease)
- Tuberous sclerosis (bourneville's disease),
- Neurofibromatosis (von recklinghausen's disease)
- Encephalo-trigeminal angiomatosis (Sturge-weber Syndrome).

Secondary tumours

- *Direct extension e.g., from malignant melanoma* of the choroid.
- *Metastatic carcinomas from the gastrointestinal* tract, genitourinary tract, lungs, and pancreas.
- *Metastatic sarcomas.*
- Metastatic malignant melanoma from the skin.

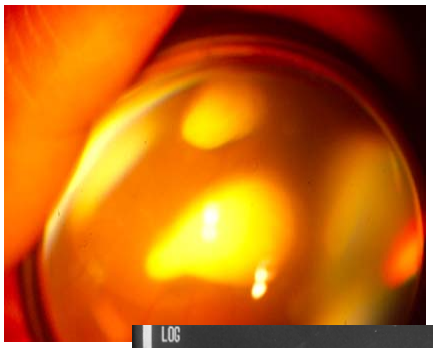
Retinoblastoma

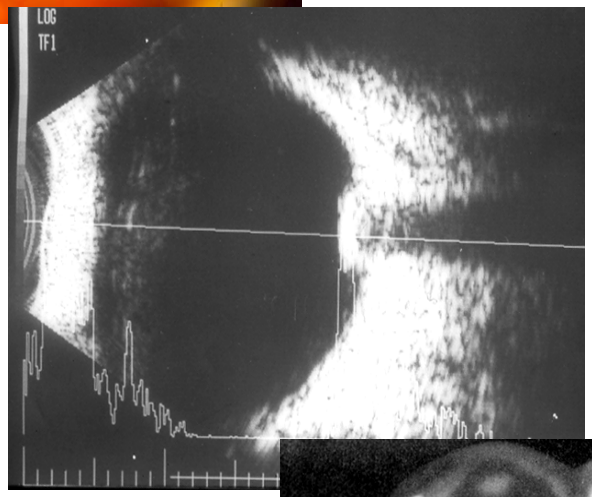
- Incidence - 1 in 18,000 to 1 in 20,000 live birth
- Av. age of diagnosis – 18 months (B/l 12mths,U/L 24mths)
- Unilateral (2/3rd) and Bilateral (1/3rd) .
- Heritable (Germline mutation) and non-heritable (Somatic mutation).
- Approximately 4% of all Pediatric tumors.
- 250-300 new cases/yr in US, about 5000 new cases of retinoblastoma are found worldwide each year,
- India and China individually estimate about 1000 new cases of retinoblastoma/per year.

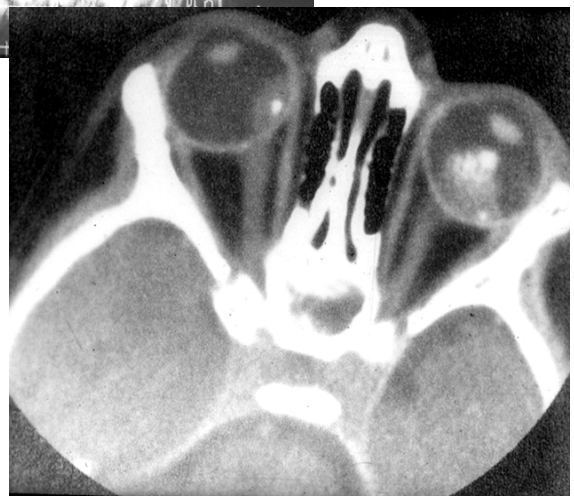
Current Opinion in Ophthalmology 2006, 17: 228-234

Indirect ophthalmoscopy

- Solitary/ Multiple yellow-white retinal tumors with prominent retinal feeder vessels







USG - masses with high reflectivity that block sound and calcification

Needle biopsy - rarely done (tumor seeding and orbital invasion)

CT scan/MRI - extraocular and intracranial extension

Use of CT scan – now controversial (↑ risk of second non ocular cancer)

Brenner et al AJO 2001;176:289-296

International Classification Of Retinoblastoma (ICRB) OCNA 2005 18:41-53

Group	Quick reference	Specific features	Risk of loss of Eye
A	Small tumor	Retinoblastoma ≤3 mm[a]	Very low risk
B	Larger tumor	Retinoblastoma >3 mm[a] or	Low risk
	Macula	macular retinoblastoma location (≤3 mm to foveola)	
	Juxtapupillary	juxtapupillary retinoblastoma location (≤1.5 mm to disc)	
	Subretinal fluid	additional subretinal fluid (≤3 mm from margin)	
C	Focal seeds	Retinoblastoma with	Moderate risk
		subretinal seeds ≤3 mm from retinoblastoma	
		vitreous seeds ≤3 mm from retinoblastoma	
		both subretinal and vitreous seeds ≤3 mm from retinoblastoma	
D	Diffuse seeds	Retinoblastoma with	High risk
		subretinal seeds >3 mm from retinoblastoma	
		vitreous seeds >3 mm from retinoblastoma	
		both subretinal and vitreous seeds 3 mm from retinoblastoma	
E	Extensive retinoblastoma	Extensive retinoblastoma occupying >50% globe or	Very high risk
		neovascular glaucoma	
		opaque media from hemorrhage in anterior chamber, vitreous or subretinal space	
		invasion of postlaminar optic nerve, choroid (>2 mm), sclera, orbit, anterior chamber	

[a] Refers to 3 mm in basal dimension or thickness.

Chemotherapy

- Purpose of chemotherapy is chemoreduction.
- Chemoreduction – use of chemotherapy to reduce the tumour size so that local treatment can be applied for ultimate tumour control.
- Chemotherapy alone is never a cure of retinoblastoma and almost always requires intensive local therapy.

OPEC Regimen

Oncovin : alkaloids, interferes with mitosis , blocking metaphase, neurotoxic.

Cisplatin: Heavy metal, penetrates cns & bone. S/E highly emetic, ototoxic, renal toxicity, neuropathy.

Etoposide: semi synthetic derivative of podophyllotoxin,a plant glycoside. Arrests cell cycle in G2 phase ,causes DNA breaks by affecting topoisimerase II function. S/E G I disturbance, alopecia, leucopenia.

Cyclophosphamide: Alkylating agent, cross linkages with DNA strand thereby impairing repair, single most effective drug. S/E alopecia, hge cystitis.

- D0-Vincristine 1.5mg/m2
  Cyclophosphamide-600mg/m2
- D1 –Cisplatin 60 mg/m2
- D2 –NIL
- D3 –Etoposide 120mg/m2
- Repeated every 21 day

Complications of chemotherapy:

- Febrile episodes
- GI toxicity/anorexia /dehydration
- Septicemia
- Vincristine neurotoxicity
- Myelosuppression (neutropenia + thrombocytopenia)
- Need for blood transfusion
- ?AML (Platinum compound)

External beam radiotherapy

- Fallen out of favour in many centers
- ↑ risk of dev of nonocular cancers in survivor of germinal RB
- Pt. radiated during first year of life are 2-8 times more likely to develop second cancer than those radiated after the age of one year

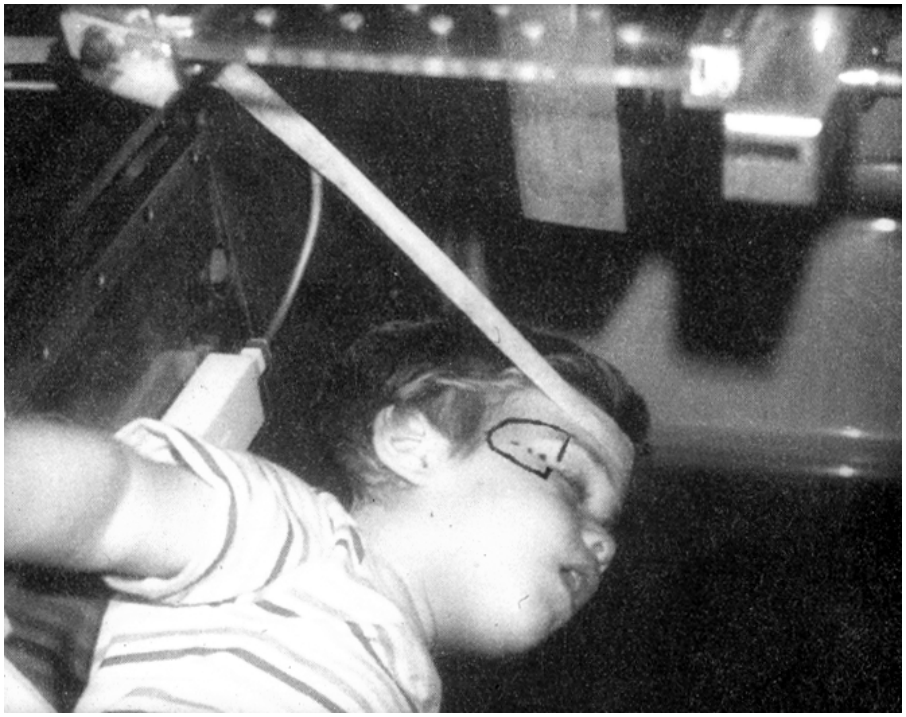
Abramson et al ophthalmic Genet 2001;108:1868-1876

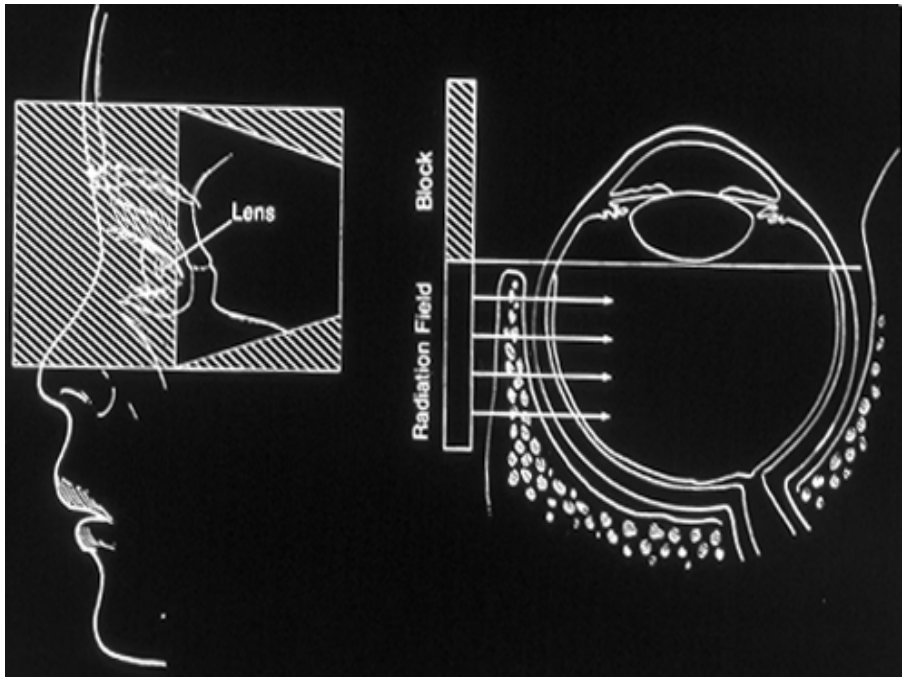
- The 30 year cumulative incidence for a second cancer in bilateral retinoblastoma is 35% for patients who received EBR compared with 6% for those who did not

Roarty et al. Ophthalmology 1988;95:1583-87

Indications of EBRT

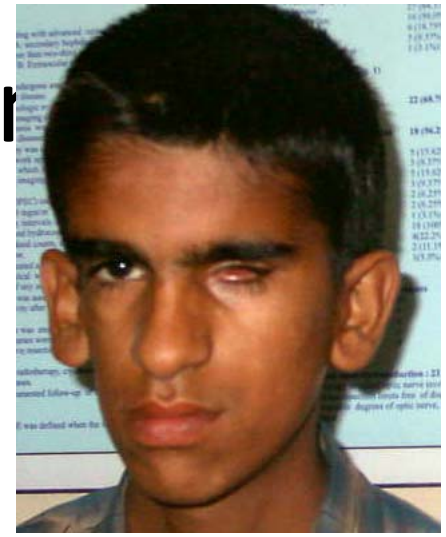
- Tumours located within the macula
- Multifocal tumours, ineffective to local therapy
- Bilateral advanced intraocular disease
- Failure of focal therapy
- Extraocular or metastatic disease along with chemotherapy



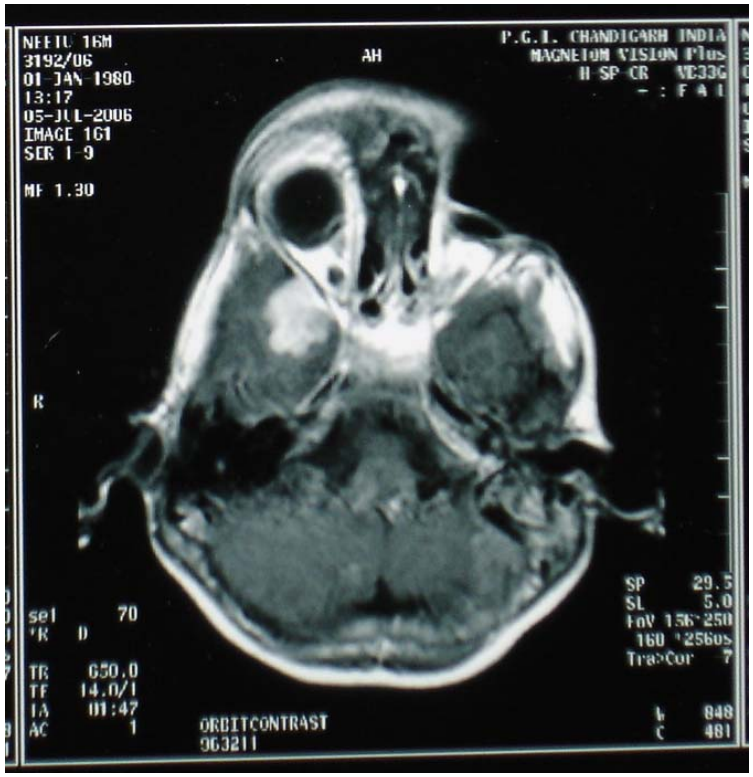


40-45 Gy, # 150-200 cGy×4-5 wks

EBRT complicatio



- Mid facial dysmorphism
- Radiation induced dry eye
- Cataract
- Retinopathy
- Optic neuropathy
- Increased incidence of 2nd tumors in field of radiation



Local treatment options for RB

- Laser photocoagulation
- Cryotherapy
- Thermotherapy
- Plaque radiotherapy

Laser photocoagulation

- Laser- diode ,argon, or xenon arc photocoagulation
- Used as a primary therapy or recurrent/new tumour
- For tumor **4.5 mm or less in basal diameter and 2.5 mm or less in thickness with no vitreous seeds**.
- Tx is directed to **delimit the tumor** and coagulate all blood supply to the tumor
- Two or three session at 1 month interval are usually adequate to control most tumor
- It offers a **70% tumor control rate** and a 30% recurrence rate
- Not used with chemoreduction b/s it causes vascular coag. and minimizes chemotherapy delivery to tumours
- Complication- transient serous RD, retinal vascular occlusion, retinal traction, retinal hole, preretinal fibrosis

Cryotherapy

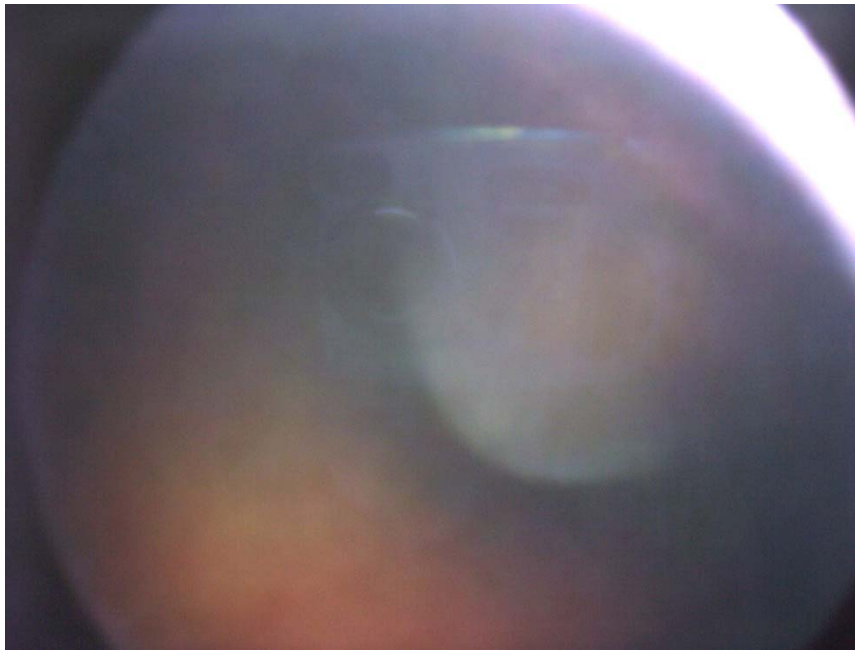
- Useful method for managing equatorial and peripheral small retinoblastoma(3.5 mm/2.0mm thickness without vitreous seeding)
- May be used as a primary t/t or as a sec. t/t for recurrent tumor
- Tumor destruction is usually achieved with one or two session of triple freeze thaw cryotherapy delivered at 1 month interval
- 90% of tumor <3mm D are cured permanently with cryotherapy

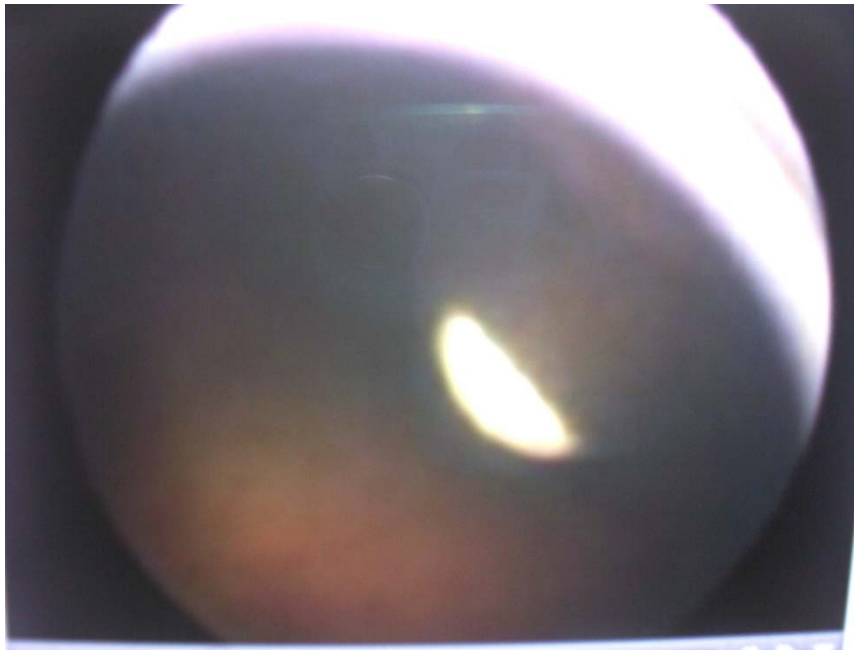
Abramson et al Arch Ophthalmol 1982;100:95-110

- Cryotherapy administered 24 hour before chemotherapy significantly increased the intravitreal penetration of carboplatin

Wilson et al Arch Ophthalmol 1996,114:1947-1950

Cryotherapy





Thermotherapy

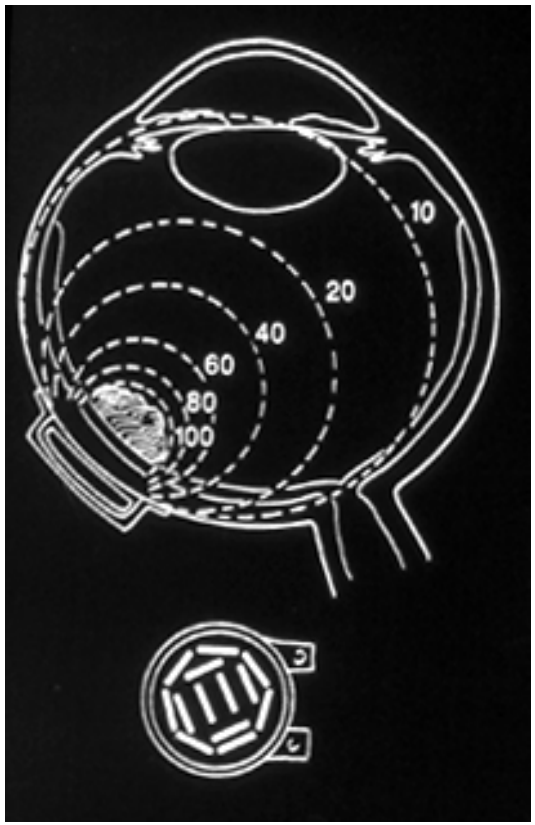
- Method of delivering heat to the eye using ultrasound, microwaves, or infrared radiation
- Applies focused heat directly to tumour at sub photocoagulation levels (42-60ºc) → apoptosis of tumor cells
- Peripapillary tumour can be treated effectively with thermotherapy
- Tumour < 3 mm in base & < 2mm in thickness can be treated with thermotherapy alone
- Done by either a transpupillary route (T T T) through operating microscope or an indirect ophthalmoscope system or trans scleral route
- 810 nm infrared laser – 1.6 - 3.0 mm spot x 350-1500 mw x 1-5 minute

Plaque radiotherapy

- A method of brachytherapy in which a radioactive implant is placed on the sclera over the base of retinoblastoma to irradiate the tumor trans-scleral

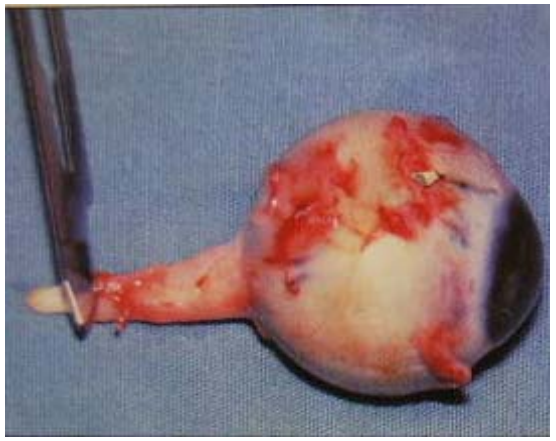
- I^{125} is most commonly used

- It requires an average of 2-4 days of treatment to deliver the total dose of 4000 cGy to the apex of the tumor



Enucleation

- Indications
  - Advanced intraocular disease (stage v)
  - Active tumour in a blind eye, eg. long standing RD
  - Glaucoma from tumour invasion
  - Failure of other treatment
  - anterior chamber involvement or choroid,
  - optic nerve or orbital tumor extension
  - No expectation for useful vision eg. Vit hge
- Critical elements of surgery
  - Avoiding perforation of globe
  - Long stump of optic nerve (>15 mm)



- 1974-1978
  96%
- 1979-1983
  86%
- 1984-1988
  55%

Shields et al. JPOS 1999; 8-18

Management of Advanced Retinoblastoma

- Following Categories are included under the definition of advanced retinoblastoma:
- Group E tumors (International Classification Of Retinoblastoma)
- Tumors with *high risk histopathologic* characteristics following enucleation.
- Orbital Retinoblastoma.
- Metastatic Retinoblastoma.


Thank You