GLAUCOMA ASSOCIATED INFLAMMATIONS

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INTRODUCTION

- Inflammatory Glaucomas (IG’S) are also referred to as Uveitic Glaucomas.
- First report was in 1813 by Joseph Beer describing it as Arthritic Iritis followed by Glaucoma and Blindness (1).
INTRODUCTION

IG IS A CONDITION IN WHICH OCULAR INFLAMMATION CAUSES A PERSISTENT AND/OR RECURRENT IOP ELEVATION RESULTING IN ANATOMIC AND PHYSIOLOGIC CHANGES CHARACTERISTIC OF GLAUCOMA.

GLAUCOMA ASSOCIATED WITH INFLAMMATIONS BELONG TO THE SECONDARY GROUP OF GLAUCOMAS.
EPIDEMIOLOGY

PREVALENCE OF GLAUCOMA IN PATIENTS WITH INTRAOCULAR OR EXTRAOCULAR INFLAMMATIONS IS BETWEEN 5-20%.(2)
OCULAR INFLAMMATIONS AFFECT BOTH AQUEOUS HUMOR PRODUCTION AND RESISTANCE TO OUTFLOW.
EFFECT ON AQUEOUS PRODUCTION

- PGE1, PGE2 RELEASED INCREASES BLOOD AQUEOUS BARRIER (BAB) PERMEABILITY \( \Rightarrow \) INCREASED SERUM PROTEIN CONCENTRATION IN AQUEOUS.
- DESTRUCTION OF CILIARY EPITHELIUM, INCREASED IRIS VASCULAR LEAKAGE ALSO INCREASES PROTEIN LEAKAGE AND FLUID EXUDATION.
- CHRONIC INFLAMMATION DAMAGE THE SECRETORY CILIARY EPITHELIUM \( \Rightarrow \) REDUCED AQUEOUS PRODUCTION.
EFFECT ON AQUEOUS PRODUCTION

- HYPOTONY FURTHER DAMAGES THE SECRETORY CILIARY EPITHELIUM → CILIARY ATROPHY
EFFECT ON AQUEOUS DRAINAGE

OBSTRUCTION TO TM.

- INFLAMMATION DISRUPTS BAB WHICH ALLOWS ENTRY OF INFLAMMATORY CELLS (WBC, MACROPHAGES, LYMPHOCYTES, FIBRINS).
- INFLAMMATORY CELLS SECRETES CYTOTOXIC MEDIATORS WHICH IMPAIR TM FUNCTION.
- THERE’S ENHANCED UVEOSCLERAL OUTFLOW FROM PGE RELEASE AND INCREASED ANTERIOR UVEA PERMEABILITY FROM REDUCED ECM OF CILIARY MUSCLE.
### Possible IOP Changes in Ocular Inflammation

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<th>Aqueous Secretion</th>
<th>Aqueous Outflow</th>
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INFECTIONS

VIRAL INFECTION
- HERPETIC KERATOUVEITIS
- HERPES SIMPLEX
- HERPES ZOSTER
- ACQUIRED IMMUNE DEFICIENCY SYNDROME (AIDS)
- CONGENITAL RUBELLA
- MUMPS

BACTERIAL INFECTION
- LEPROSY (HANSEN’S DISEASE)
- SYPHILIS
- TUBERCULOSIS

INFLAMMATORY CONDITIONS MORE COMMONLY ASSOCIATED WITH GLAUCOMA
Parasitic infection

- ONCHOCERCIASIS
- TOXOCARIASIS
- TOXOPLASMOSIS
- ACANTHAMOEBA
- FUNGAL INFECTION
- COCCIDIOIDOMYCOSIS
Autoimmune

ASSOCIATED WITH ARTHRITIS
- JUVENILE RHEUMATOID ARTHRITIS
- ANKYLOSING SPONDYLITIS
- REITER’S SYNDROME
- PSORIATIC ARTHRITIS
GLAUCOMATOCYCLITIC CRISIS (POSNER-SCHLOSSMAN SYNDROME)
FUCH’S HETEROCHROMIC IRIDOCYCLITIS (FHIC)
SARCOIDOSIS
GRANT’S SYNDROME (KERATIC PRECIPITATES ON THE TRABECULAR MESHWORK)
VOGT-KOYANAGI-HARADA (VKH) SYNDROME.
COMMON INFLAMMATIONS.

MASQUERADE SYNDROMES
- INTRAOCULAR NEOPLASIA
- RETINAL DETACHMENT

MISCELLANEOUS
- SCLERITIS
- EPISCLERITIS
- BEHÇET’S DISEASE
- SYMPATHETIC OPHTHALMIA.
AYANRU ET AL IN BENIN IDENTIFIED THE AETIOLOGICAL FACTORS IN ANTERIOR UVEITIS AS LEPROSY, TUBERCULOSIS, HERPES ZOSTER AND ONCHOCERCIASIS.
REMAINS A DIAGNOSTIC AND THERAPEUTIC CHALLENGE (AS IN MOST CASES OF SECONDARY GLAUCOMAS).

USE OF TOPICAL STEROIDS IS A COMMON CAUSE OF IOP ELEVATION. STEROID RESPONDERS ARE OFTEN A THERAPEUTIC CHALLENGE.

RELATIVE/ABSOLUTE CONTRA INDICATIONS IN THE USE OF PG ANALOGUES AND MIOTICS RESPECTIVELY.

RISK OF SCARRING POST TRABECULECTOMY.
MANAGEMENT CONCERNS

- IOP FLUCTUATIONS: USUALLY DRAMATIC IN UVEITIC GLAUCOMA SO PHASING MAY BE HELPFUL.
- CILIARY BODY SHUTDOWN: REDUCED IOP IN ACUTE EXACERBATION OF CHRONIC ANT UVEITIS.
- VARIOUS MECHANISMS ARE INVOLVED IN IOP RISE.
- ASSESSMENT OF GLAUCOMATOUS DAMAGE COULD BE DIFFICULT BECAUSE OF MIOTIC PUPIL/MEDIA OPACITIES.
CLINICAL ENTITIES OF IG’s

- ANGLE CLOSURE WITH PUPIL BLOCK
- ANGLE CLOSURE WITHOUT PUPIL BLOCK
- OPEN ANGLE GLAUCOMA
- POSNER SCHLOSSMAN SYNDROME.
Angle Closure Glaucoma With Pupil Block (ACGWPB)

- POST SYNECHIAE WITH SECLUSIO PUPILLAE   IRIS BOMBE   PAS   RAISED IOP.
- USUALLY UNCOMMON BECAUSE OF CILIARY SHUT DOWN.
- FEATURES OF INFLAMMATION (BLURRED VISION, ACHING PAIN, EXCESSIVE TEARING WITH PHOTOPHOBIA AND REDNESS) IN THE PRESENCE OF AQUEOUS REACTIONS SEEN ON S/L/E.
GONIOSCOPY : ANGLE CLOSURE FROM IRIDOTRABECULAR CONTACT RELIEVED BY INDENTATION GONIOSCOPY. ANGLE NEOVASCULARIZATION AT TIMES.
ANGLE CLOSURE GLAUCOMA WITHOUT PUPIL BLOCK (ACGWOPB)

- CHRONIC ANTERIOR UVEITIS DEPOSITION OF INFLAMMATORY CELLS/DEBRIS IN THE ANGLE.
- ORGANIZATION/CONTRACTION PULL OF PERIPHERAL IRIS OVER THE TRABECULUM GRADUAL/PROGRESSIVE ANGLE CLOSURE RAISED IOP.
- WORSE IN PREDISPOSED EYES (NARROW ANGLES) AND THOSE WITH GRANULOMATOUS INFLAMMATIONS WITH INFLAMMATORY NODULES IN THE ANGLE.
OPEN ANGLE GLAUCOMA

ACUTE ANT UVEITIS

- SECONDARY OPEN ANGLE GLAUCOMA USUALLY RESULTS AS THE ACUTE INFLAMMATION IS SUBSIDING AND THE CILIARY BODY FUNCTION IS RETURNING.

- STEROID INDUCED.
OPEN ANGLE GLAUCOMA

- TRABECULAR OBSTRUCTION (INFLAMMATORY CELLS/DEBRIS),

- ACUTE TRABECULITIS (OEDEMA OF TM, DIMINISHED INTERTRABECULAR POROSITY, REDUCTION IN OUTFLOW FACILITY) ... HERPES SIMPLEX/HERPES ZOSTER.
OPEN ANGLE GLAUCOMA

CHRONIC ANT UVEITIS

- CHRONIC TRABECULITIS = TRABECULAR SCARRING AND/OR SCLEROSIS WITH SOME DEGREE OF SYNECHIAEL CLOSURE.
- MEDICAL TREATMENT GOOD IF THE ANGLE IS COMPLETELY OPEN AND THERE ARE NO PAS OR PIGMENT DEPOSIT.
- INFLAMMATION TREATED WITH STEROIDS.
USE OF PG ANALOGUE IN UVEITIC GLAUCOMA IS TEMPERED BY THE RISK OF PRECIPITATING UVEITIC ATTACK OR CMO.

TOPICAL BETA BLOCKERS USUALLY FIRST LINE. CAN BE COMBINED WITH ALPHA 2 ADRENERGIC AGONISTS OR CAI.

MIOTICS ARE CONTRAINDICATED: INCREASE VASCULAR PERMEABILITY AND MAY INDUCE INFLAMMATION. ENHANCES FORMATION OF POST SYNECHIAE.

SURGICAL PROCEDURES AS APPROPRIATE.
Posner Schlossman Syndrome (Glaucomatocyclitic syndrome)

- Characterised by recurrent episodes of unilateral acute secondary open angle glaucoma associated with mild anterior uveitis (cyclitis esp).
- Affects young adults 40% of whom are +ve for HLA-BW54
- M>F
- Usually presents between 20-50yrs.
PSS

- HERPES SIMPLEX VIRUS /CMV HAS BEEN INDICTED.
- SOME DEGREE OF ABNORMAL VASCULAR PROCESS.
- RAISED IOP USUALLY RESULTS FROM ACUTE TRABECULITIS. IOP LEVEL USUALLY OUT OF PROPORTION TO THE SEVERITY OF THE UVEITIS.
PSS

- THERE’S UNILATERAL RAISED IOP FOR A FEW HOURS TO SEVERAL DAYS BUT IN 50% OF CASES THE PATIENTS HAVE BILATERAL INVOLVEMENT AT DIFFERENT TIMES.

- MAJORITY DEVELOP CHRONIC IOP ELEVATION SO IOP MUST BE FOLLOWED UP.
OCULAR DISCOMFORT, HALOES, SLIGHT VISUAL BLUR
S/L/E: CORNEAL EPITHELIAL OEDEMA, AQUEOUS CELLS, FINE WHITE KP’S.
HETEROCHROMIA WITH ANISOCORIA AND MYDRIASIS IN AFFECTED EYE.
GONIOSCOPY: OPEN ANGLES (CAN BE CONFUSED WITH PRIMARY ANGLE CLOSURE GLAUCOMA IF GONIOSCOPY IS NOT DONE), PAS IS ABSENT.
PSS

- IOP IN THE RANGE OF 40-70MMHG DURING ATTACKS
- NORMAL VF AND OPTIC DISCS
- NORMAL IOP, OUTFLOW FACILITY AND PROVOCATIVE TESTING BETWEEN ATTACKS.
Treatment of PSS

- TOPICAL STEROIDS: INFLAMMATION CONTROL
- AQUEOUS SUPPRESSANT: IOP REDUCTION
- ORAL NSAIDS MAY ALSO BE BENEFICIAL.
GENERAL MANAGEMENT PRINCIPLES

- TREATMENT AIMED AT CONTROLLING INFLAMMATIONS AS WELL AS REDUCTION OF IOP TO PREVENT COMPLICATIONS ASSOCIATED WITH SYNECHIAL SCARRING, OPTIC NERVE DAMAGE AND HYPOTONY.
CORTICOSTEROIDS:
- FIRSTLINE IN THE TREATMENT OF NON INFECTIOUS OCULAR INFLAMMATIONS.
- BLOCKS THE RELEASE OF ARACHIDONIC ACID AND SUBSEQUENT RELEASE OF PG’S.
- CAN BE TOPICAL, PERIOCULAR, INTRAVITREAL OR SYSTEMIC.
Corticosteroids

- RISK OF IOP ELEVATION: ORAL < TOPICAL < PERIBULBAR < INTRAVITREAL.
Corticosteroids

- TOPICAL STEROIDS PREFERRED IN ANTERIOR UVEITIS,
- ACETATE HAS BETTER INTRA OCULAR ANTI INFLAMMATORY FUNCTION THAN PHOSPHATES,
- PREDNISOLONE PREFERRED TO DEXAMETHASONE BECAUSE OF ITS LOWER IOP RAISING EFFECT.
- CORTICOSTEROID SPARING ANTI INFLAMMATORY AGENTS SHOULD BE USED IN CASES THAT NEEDS LONGTIME TREATMENT.
TREATMENT OF INFLAMMATIONS

CYCLOPLEGICS:
CYCLOPENTOLATE, HOMATROPINE
- REDUCES THE PAIN OF CILIARY AND IRIS SPHINCTER SPASMS
- HELPS TO BREAK OR PREVENT PS.
- REDUCE PHOTOPHOBIA
TREATMENT OF INFLAMMATIONS

IMMUNOSUPPRESSIVE AGENTS:
- CASES REFRACTIVE TO CORTICOSTEROIDS OR WHEN CHRONIC SIDE EFFECT OF CS’S ARE BEING AVOIDED (BONE DEMINERALIZATION, DM, PSYCHOSIS ETC)
- ANTIMETABOLITES: METHOTREXATE
- T CELL SUPPRESSORS: CYCLOSPORINE
- CYTOTOXIC AGENTS: CYCLOPHOSPHAMIDE AND CHLORAMBUCIL.
TREATMENT OF GLAUCOMAS

- NEED TO BALANCE THE ANTI INFLAMMATORY AGENTS AND THE IOP LOWERING DRUGS.
- CONTROLLING THE INFLAMMATION LOWERS THE IOP IN SOME CASES.
TREATMENT OF GLAUCOMA

- TOPICAL BETA BLOCKERS (TIMOLOL ETC)
- SELECTIVE ALPHA 2 ADRENERGIC AGONISTS (BRIMONIDINE)
- CAI’S: TPICAL, ORAL, OR SYSTEMIC
- PG ANALOGUES: USE TEMPERED BECAUSE OF WORSENING INFLAMMATION AND THE RISK OF CMO.
- CONCURRENT USE OF NSAID’S MAY PARTIALLY REDUCE THE EFFECT OF PGA’S AND ADRENERGIC AGONISTS.
TREATMENT OF GLAUCOMAS

HYPEROSMOTIC AGENTS:
- DEHYDRATE THE VITREOUS
- USED IN ACUTE SETTINGS
- CAUTIOUS USE IN PATIENTS WITH DEPRESSED CARDIOVASCULAR FUNCTIONS
TREATMENT OF GLAUCOMAS

MIOTICS:
- CONTRAINDIATED IN IG’S
- DISRUPT BAB WHICH WORSENS INFLAMMATION,
- POTENTIAL TO INDUCE FORMATION OF PS,
- AGGRAVATE SYMPTOMS OF INFLAMMATION CAUSED BY CILIARY SPASM.
LASER MANAGEMENT:

- LASER IRIDOTOMY IN ANGLE CLOSURE CASES WITH PUPIL BLOCK/ IRIS BOMBE.
- CAN BE PROPHYLACTIC IN PAS.
- ND-YAG LASER PREFERRED OVER ARGON LASER (LOWER ENERGY, FEWER APPLICATIONS AND LOWER POST OP INFLAMMATION.)
Laser Management

- The hole could get blocked again with uveitis especially small ones.
- Steroids use to prevent post laser inflammation.
- Surgical iridectomy done in failed iridotomy or when there’s contraindication. More effective but higher risk of inflammation exacerbation.
Surgical Management

RESERVED FOR UNCONTROLLED IOP DESPITE MAXIMALLY TOLERATED MEDICAL THERAPY AS WELL AS IN CASES OF PUPILLARY BLOCK ANGLE CLOSURE GLAUCOMA.
Trabeculectomy

COMMONLY DONE THOUGH WITH VARYING PROGNOSIS.

- INFLAMMATION TO BE CONTROLLED FOR A MINIMUM OF 3 MONTHS BEFORE SURGERY.
- PREOP TOPICAL STEROIDS: PROPHYLAXIS AGAINST RECURRENT INFLAMMATION, REDUCE CONJUNCTIVAL INFLAMMATORY CELL POPULATION.
- SYSTEMIC STEROIDS IN SOME CASES OF LABILE INFLAMMATORY DISEASE.
Trabeculectomy

- USUALLY COMBINED SURGERY NOT APPROPRIATE. BETTER RESULTS WITH CATARACT SURGERY DONE 6 MONTHS AFTER TRABECULECTOMY.
- MMC USE NOT DEBATABLE.
- TIGHT CLOSURE OF SCLERAL FLAP: POST OP HYPOTONY FROM REDUCED AQUEOUS PRODUCTION AND RESTRICTED AQUEOUS OUTFLOW.
- STEROIDS TAPERED BASED ON INFLAMMATION AND APPEARANCE OF THE FILTERING BLEB.
CATARACT FORMATION, BLEB LEAKAGE AND CHOROIDAL EFFUSION ARE COMMON COMPLICATIONS.
GDD

- SHOULD BE CONSIDERED IN CASES WHERE TRABEC/MMC HAS POOR SUCCESS RATE (APHAKIA, CHILDREN WITH CHRONIC ANT UVEITIS, PREVIOUSLY FAILED TRABECULECTOMY).
- BETTER IOP CONTROL IN UVEITIC EYES THAN IN OTHER GLAUCOMAS(ALSO REDUCES AQUEOUS SECRETION).
- AHMED VALVE, SINGLE PLATE MOLTENO, 250 BAERVEELDT.
2 STEP PROCEDURE RECOMMENDED BECAUSE OF POST OP HYPOTONY...A SUTURE FED INTO THE TUBE AND LATER REMOVED.

MANY STUDIES ACHIEVED >90% SUCCESS RATE(IN CONTROLLING IOP, REDUCING THE NEED FOR ANTIGLAUCOMA DRUGS AND PRESERVING VA) AT 1 YR FOLLOW UP.(3)

TUBE OR VALVE OCCLUSION FROM FIBROSIS, HYPOTONY, CHOROIDAL EFFUSION OR DETACHMENT ARE SOME OF THE COMPLICATIONS.
Deep Sclerectomy

- NON PENETRATING FILTERING SURGERY INVOLVING EXCISION OF THE INTERNAL WALL OF SCHLEMM’S CANAL ALLOWING SUBCONJUNCTIVAL FILTRATION WITHOUT ACTUALLY ENTERING THE AC.
- ROLE STILL UNDER EVALUATION.
Trabeculodialysis

- MODIFIED GONIOTOMY
- TO TREAT REFRACTORY CASES OF OPEN ANGLE GLAUCOMA IN CHILDREN AND YOUNG ADULTS
- 60% SUCCESS RATE.
Trabeculodialysis

- Making an incision along Schwalbe’s line to establish communication between Ant Chamber and Schlemm canal.

- Goniotomy in children.

- Trabeculectomy and tube shunts are preferred.
Cyclodestructive Procedures

- DESTRUCTION OF THE CILIARY PROCESS TO REDUCE AQUEOUS PRODUCTION.
- LAST RESORT
- CAUTIOUS USE BECAUSE: 1) INCREASE INTRAOCULAR INFLAMMATION 2) PROFOUND HYPOTONY \( \rightarrow \) PHTHISIS BULBI.
- CYCLOCRYOTHERAPY SAID TO BE MORE EFFECTIVE IN TREATING UVEITIC GLAUCOMA THAN NVG.
CONCLUSION

- UNILATERAL GLAUCOMA SHOULD ALWAYS RAISE A SUSPICION OF INFLAMMATORY CAUSE.
- DIAGNOSIS AND TREATMENT OF INFLAMMATORY GLAUCOMAS IS AIMED AT BOTH THE INFLAMMATION AND THE GLAUCOMA.
THANK YOU FOR YOUR TIME
REFERENCES

- Jack J. Kanski