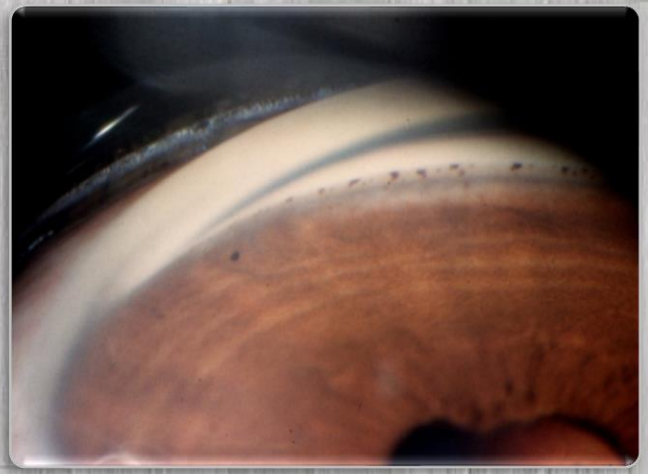
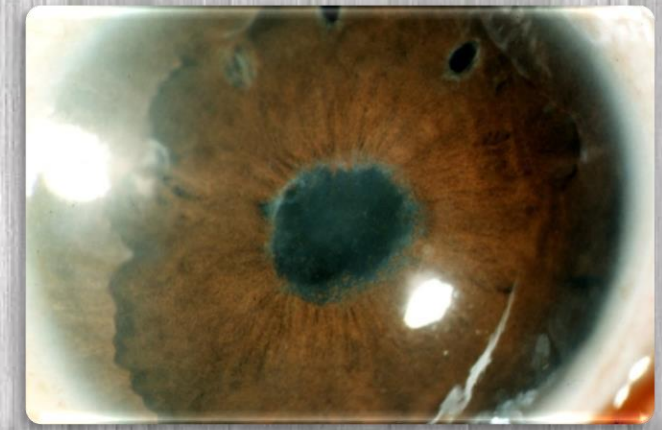
UVEITIC GLAUCOMA





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Glaucoma Associated with Uveitis

First reported by:

- Joseph Beer in 1813
- Desmans in 1821
- Mackenzie in 1830

Glaucoma Associated with Uveitis

Prevalence: over all 10-20 %

Incidence : increases with time

6.6 % at 1 yr

11.2 % at 4 yrs

22.7 % at 10 years

Similar among different types of Uveitis

Neri et al.
J Glaucoma 2004

Secondary Glaucoma Uveitis Patients

Clinical Entry	Uveitis			Secondary Glaucoma	
	Patients	%	Affected Eyes (A)	Eyes (B)	B/A x
HTLV – 1 uveitis	194	17.7	260	42	16.2
Vogt-Koyanagi-Harada's disease	107	9.7	214	35	16.4
Ocular toxoplasmosis	85	7.7	95	11	11.6
Sarcoidosis	71	6.5	129	44	34.1
Behcet's disease	55	5.0	96	20	20.8
Herpetic anterior uveitis	22	2.0	23	7	30.4
HLA-B27-related acute anterior uveitis	21	1.9	25	5	20.0
Posner-Scholossman syndrome	10	0.9	10	10	100*
Others	92	8.4	116	23	16.1
Idiopathic uveitis	442	40.2	636	96	15.0
TOTAL	1099	100	1604	293	18.3

Takahashi T et al.
Jpn J Ophthalmol 2002;46:556-62

Incidence of glaucoma among Uveitic patients in KAUH (our experience)

DIAGNOSIS	Uveitis		Uveitic Secondary Glaucoma	
	N	Eyes (%)	Eyes	%
Herpetic Uveitis	64	15 (23.4)	13	20.3
Sarcoidosis	29	4 (13.8)	2	6.9
Multiple Sclerosis	16	2 (12.5)	0	0.0
Toxoplasmosis	76	8 (10.5)	1	1.3
Others	11	1 (9.1)	0	0.0
Juvenile Idiopathic Arthritis	26	2 (7.7)	6	23.1
HLA-B27-Positive Anterior Uveitis	58	4 (6.9)	16	27.6
Fuchs' Uveitis	73	5 (6.8)	17	23.3
Presumed Tuberculous Uveitis	213	10 (4.7)	18	8.5
Vogt-Koyanagi-Harada Disease	251	9 (3.6)	41	16.3
Idopathic Uveitis	292	9 (3.1)	49	16.8
Behcet's Uveitis	104	3 (2.9)	6	5.8
Sympathetic Ophthalmia	7	0 (0.0)	0	0.0
TOTAL	1220	72 (5.9)	169	13.9

Al Rubaie et al. 2013

Glaucoma Associated with Uveitis

- 25% of uvetic patients:Inflammatory Ocular Hypentension Syndrome IOHS [Rx : to]
- 5 - 19% of uveitic patients: Develop S.G.
- 5.5% - 13% with worse visual prognosis

Risk factors for elevated IOP in uveitis patients

1. Chronicity [reflect comulative effect of infamm.on TM]
2. Age [uveitis is a disease of young and middle age]
3. Corticosteroids
4. Severity [PS 45% vs 17%] [HLA-B-27]

Herbert H et al.
J. Glaucoma 2004;13:96-99

Pathogenesis

A. Biochemical and cellular changes in aqueous composition and its dynamics

A. Direct involvement of the TM

B. Corticosteroids effects on the TM

Open Angle

C. Morphologic changes in the AC angle (Angle Closure)t

Pathogenesis

A. Biochemical and cellular changes in aqueous composition
   1. Proteins
   2. Inflammatory Cells
   3. Inflammatory Mediators (Cytokines) and Toxic Agents

Pathogenesis

A. Biochemical and cellular changes in aqueous composition

1. Proteins

Uveitis

↓

↑ permeability of blood-aqueous barrier
(non-specific)

↓

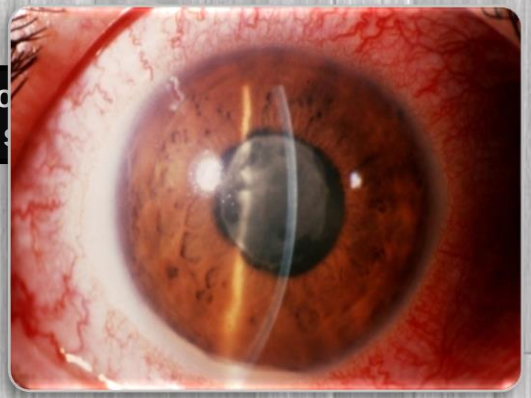
↑ proteins in the aqueous (resembles undiluted serum)

↓

persistent

Affects IOP

Normal aqueous co
in the



INDIRECTLY
Post Synechiae & PAS

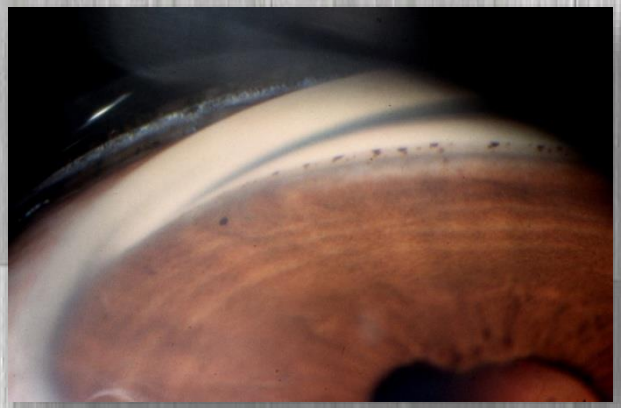
DIRECTLY
Aqueous sludging, impeding outflow

Pathogenesis

A. **Biochemical and cellular changes in aqueous composition**

   2. **Inflammatory Cells**

Affects IOP



INDIRECTLY

By releasing inflammatory mediators, altering TM cells size, function and extra-cellular matrix composition.

Pathogenesis

A. Biochemical and cellular changes in aqueous composition

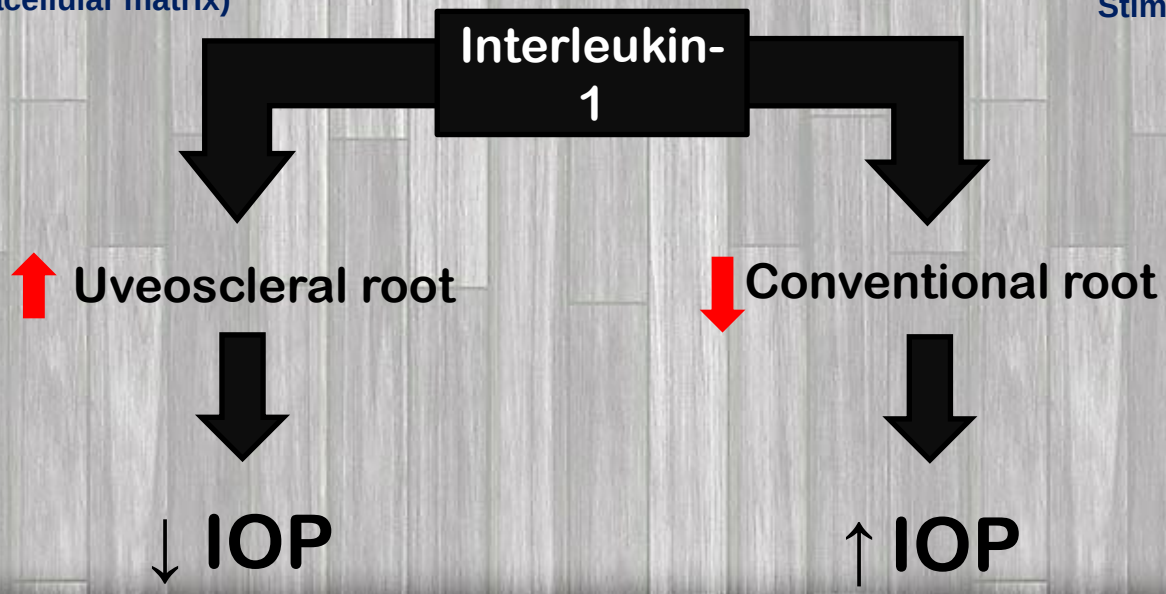
3. Inflammatory Mediators (Cytokines) and Toxic Agents

(Activate matrix metalloproteinases)

↓

(Degradation of extracellular matrix)

Adverse effect on TM
(Direct Cyto toxic
and
Stimulate migration)



Pathogenesis

B. Direct involvement of the TM

- Prosner-sehlossman Syndrome
- Fuchs Uveitis
- Herpetic Keratouveitis

Pathogenesis

C. Effect of Corticosteroids on the TM

- 33% of normal population, moderate responders
- 4 - 6% high responders (>15mmHg)
- 50% or more of POAG population, high responders

Weireb RN et al.
Invest Ophthalmol Vis Sci 1985;26:170-5
Levin DS, et al.
Am J Ophtalmol 2002;133:196-202

Pathogenesis

C. Effect of Corticosteroids on the TM

Affects IOP

↓

Reduction of aqueous outflow BY

↓

1. Alteration in cell size
2. Cytoskeletal organization
3. Extra-cellular matrix deposition

Veda J et al. Invest Ophthalmol Vis Sci 2003;44:4772-9
Velota et al. Curr Opn Ophthalmol 2004;15:136-140

Pathogenesis

Structural Changes in the Anterior Chamber Angle

- Open Angle Uveitic Glaucoma
  - Mechanical blockage to outflow pathways
  - Chronic inflammatory damage to outflow pathways
  - Trabeculitis
  - Steroid-induced

Pathogenesis

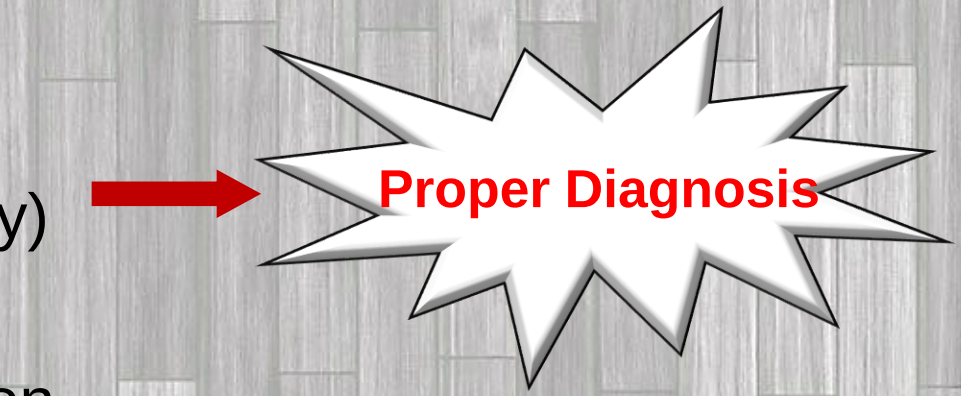
D. Morphologic changes in the Anterior Chamber angle

- Angle Closure Uveitic Glaucoma

Management

Evaluation

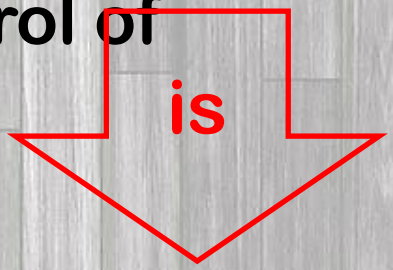
- History & Symptoms
- Visual function (perimetry)
- Slit-lamp: Etiology clues
- Gonioscopy: Classification
- Fundus biomicroscopy: Clues, C/D, NFL
- UBM: Iridocorneal angle, Ciliary body



Management

Control Inflammation

Undertreating
uveitis with corticosteroids to minimize IOP evaluation at the expense of good control of inflammation



a false economy

Management

- About 70% respond to medical therapy
- About 30% surgical and medical treatment

Management

- 24% of adults and 26% of children responded to medications
- 59% of children and 35% of adults required surgery

Heinz et al.,
Ocul Immunol Inflamm 2009

- **In our patients, 49% required surgery.**

Management

- **Medical therapy:**
  - Beta-blockers
  - Cycloplegics
  - Adrenergic agonists
  - CA inhibitors
  - Prostaglandin analogues
  - **Miotics** - Avoid

Management

- **Surgical Treatment:**
  - Laser iridotomy.
  - Trabeculoplasty. [ineffective]
  - Trabeculectomy ± antimetabolites.
  - **Nonpenetrating deep sclerectomy.**
  - Tube Surgery.
  - Goniotomy.
  - Cyclophotocoagulation

Trabeculectomy in Uveitic Glaucoma

- **Success rate is variable**
  (30 – 78 % after 5 yr)
- **Hypotony, ↑ inflammation and cataract are significant complications**

Stavrou and Murray, Am J Ophthalmol 1999
Towler et al., Ophthalmology 2000
Souissi et al., J Fr Ophthalmol 2006
T Kaburaki et al., Eye 2009
Iwao et al., J Glaucoma 2014

Trabeculectomy in Uveitic Glaucoma

- Trabeculectomy with MMC was less effective in UG than in POAG
- UG eyes experienced more frequent cataract surgeries after trabeculectomy than POAG eyes

Iwao K et al., J Glaucoma 2012

Tube surgery in Uveitic Glaucoma

- **Success rates:** 57–94% at 1 year
  < 60% at 2 years

Mata et al., Ophthalmology 1994
Papadaki et al., Am J Ophthalmol 2007
Bettis et al., J Glaucoma 2014

- **Corneal decompensation**: 27%

Topouzis et al., Am J Ophthalmol 1994
Vudri M, Acta ophthalmologica 2010

- **Tube occlusion:** 26.3%

Ozdal et al., Eye 2006

Tube surgery in Uveitic Glaucoma

- Tube surgery in children with UG are independently associated with decreased Endothelial Cell Density

Ayuso V et al.
Am J Ophthalmology 2013

Cyclophotocoagulation in Uveitic Glaucoma

Unsatisfactory:

- Qualified success: 32% (short term F/U)

Heinz et al.
Br J Ophthalmol 2006

- Rate of hypotony in uveitic eyes was 19%

Murphy et al.
Br J Ophthalmol 2003

Deep Sclerectomy in Uveitic Glaucoma

International Publications

ORIGINAL PAPER

Efficacy and safety of deep sclerectomy in uveitic glaucoma

Saleh A. Al Obeidan · Essam A. Osman ·
Abdulrahman M. Al-Muammar ·
Ahmed M. Abu El-Asrar

Ocular Immunology & Inflammation, Early Online, 1–8, 2014

ISSN: 0927-3948 print / 1744-5078 online
DOI: 10.3109/09273948.2013.870213

informa
healthcare

ORIGINAL ARTICLE

Long-term Evaluation of Efficacy and Safety of Deep Sclerectomy in Uveitic Glaucoma

Saleh A. Al Obeidan, MD, Essam A. Osman, MD, FRCS, Ahmed Mousa, PhD, Abdulrahman M. Al-Muammar, MD, and Ahmed M. Abu El-Asrar, MD, PhD

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Deep Sclerectomy in Uveitic Glaucoma

33 Eyes (21 patients)

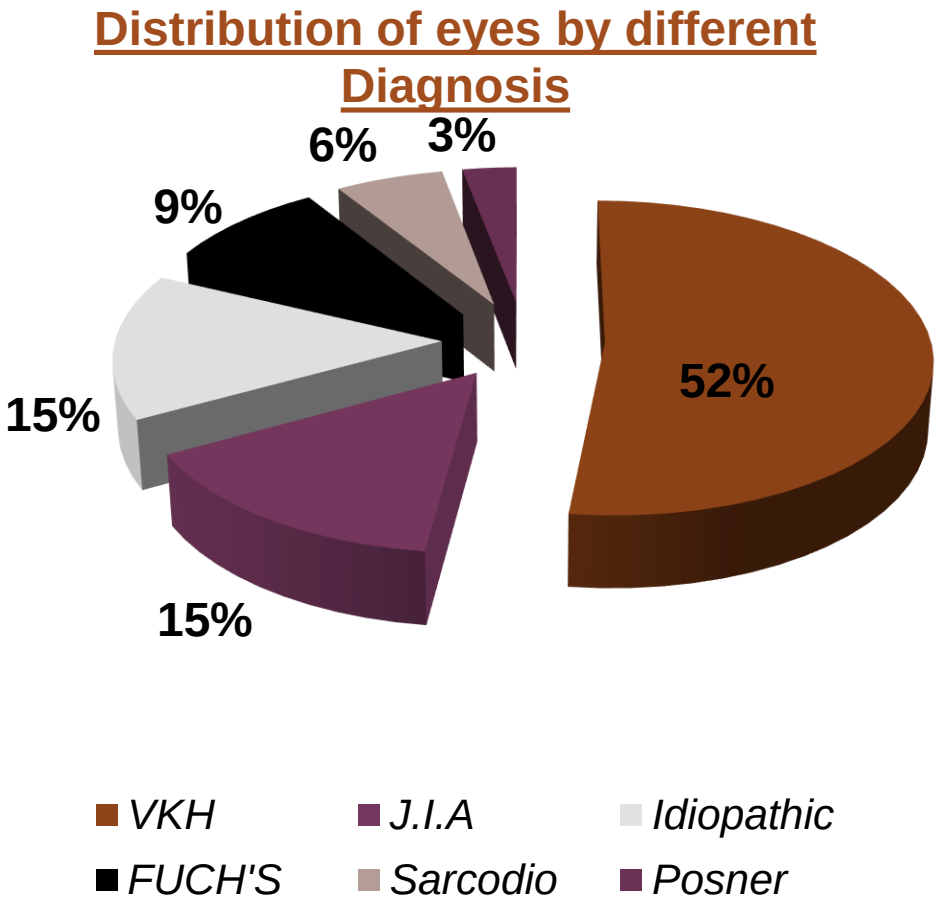
Gender: 7 (*33.3%*) males
14 (*66.7%*) females

Age: Mean (SD) 29.70 ± 14.34
(Range 11 – 71 yr)

Deep Sclerectomy in Uveitic Glaucoma

Etiology:

VKH	17 eyes
JIA	5 eyes
Fuchs' Uveitis	3 eyes
Idiopathic	5 eyes
Sarcoidisis	2 eyes
Posner sch. Syn.	1 eye



Deep Sclerectomy in Uveitic Glaucoma

Pre Intervention Clinical Indices:

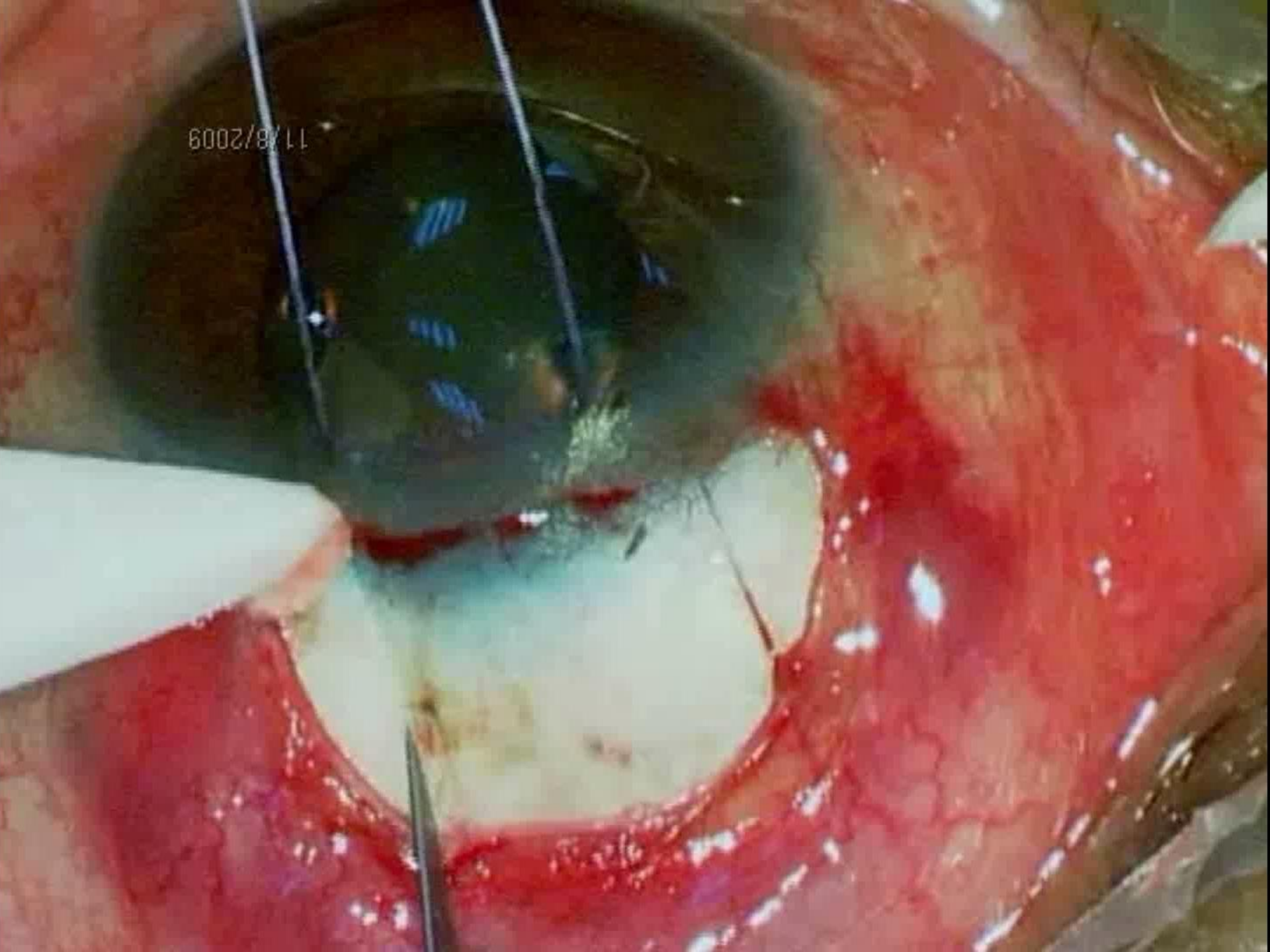
Initial IOP	:	**Mean (SD) 37.2 ± 8.81 (Range: 16-53)*mmHg***
Initial V/A	:	**CF - 20/20**
Gonioscopy	:	**Open angle**
Lens status	:	**Phakic 32 (97.0%) eyes**
		Pseudophakic 1 (3.0%) eye
Previous surgeries	:	**2 (6.1%) eyes**
No. of meds	:	**Mean (SD) 3.24 ± 0.51 (Range: 2 - 4)**

Deep Sclerectomy in Uveitic Glaucoma

- **Preoperative Preparation:**
  - Well controlled inflammation
  - Hourly topical steroids 1 week before surgery
  - I.V. methylprednisolone - 3 doses
  - Maximum tolerated anti-glaucoma medications
  - Continuation of systemic medications

Deep Sclerectomy in Uveitic Glaucoma

- **Technique:**
  - Fornix based conj. Flap
  - MMC 0.2 mg/ml for 2 minutes
  - All patients received implant either T. flux or S.K. gel


11/8/2009

Deep Sclerectomy in Uveitic Glaucoma

- **Postoperative Care:**
  - Cont. of maintenance dose of:
    - Immunosuppressive and/or
    - Immunomodulatory therapy
  - Hourly topical steroids – tapered over several weeks
  - Topical antibiotics – 4 weeks
  - Frequent visits

Deep Sclerectomy in Uveitic Glaucoma

- **Postoperative Care:**
  - **Additional interventions were needed in 14 eyes (42.4%)**
    - **Subconjunctival MMC 2 (6.1%) eyes**
    - **Goniopuncture 12 (36.4 %) eyes**

Deep Sclerectomy in Uveitic Glaucoma

CRITERIA FOR SUCCESS

- **Complete success:**
  IOP $\geq$ 6 and $\leq$ 22 mmHg without medications
- **Qualified success:**
  IOP $\leq$ 22 mmHg with medications
- **Complete failure:**
  Eyes requiring further surgery to control IOP

Deep Sclerectomy in Uveitic Glaucoma

RESULTS

F/U (months)
Mean (SD): 45.2 ± 16.7 (Range 12-120)

Final IOP (mmHg)
Mean (SD): 14.67 ± 4.26 (Range 8-24)

Final Medications
Mean (SD): 0.41 ± 0.68 (Range 0-2)

Deep Sclerectomy in Uveitic Glaucoma

RESULTS (Cont'd):

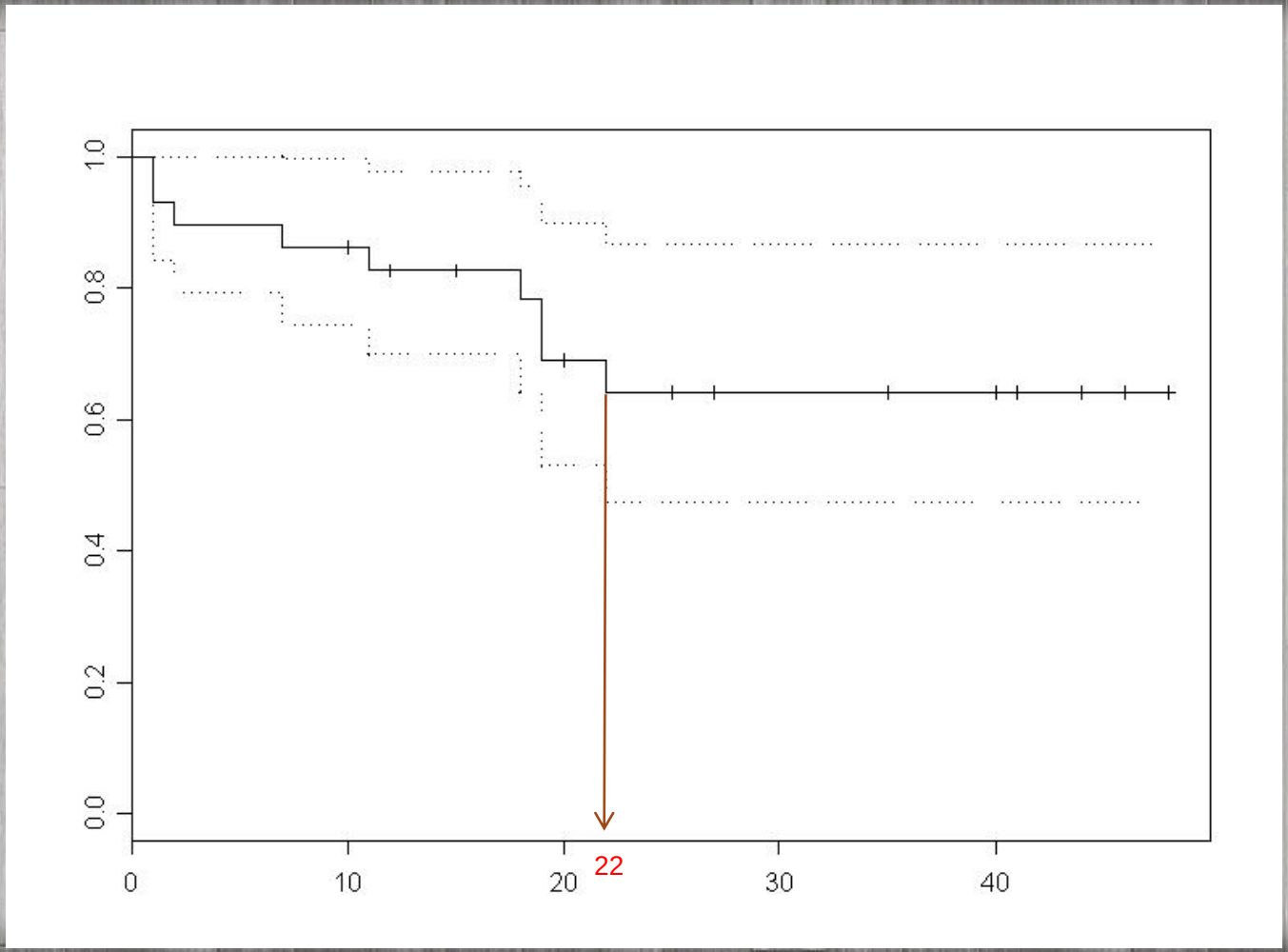
Achieved Success Rates

• Complete success	24/33	72.7 %
• Qualified success	7/33	21.2 %
• Over-all success	31/33	93.9 %
• Complete Failure	2/33	6.1 %

Transitional Distribution of eyes by VA group

Improved : 4/33 (12.1%) Worsen : 2/33 (6.1%) Stable : 27/33 (81.8%) P value : <0.0001		Pre Intervention			
		≤ 20/200	20/50 -20/160	≥ 20/40	TOTAL
Post Intervention	≥ 20/40	1	1	22	24
	20/50 - 20/160	2	3	1	6
	≤ 20/200	2	1	0	3
	Total	5	5	23	33

Kaplan Meier Survival Analysis



Maximum Failure Time: 22 Months
Estimated Mean Survival Time: 35.17 Months (S.E: 3.52), 95% CI: [28.274 – 42.071]

Deep Sclerectomy in Uveitic Glaucoma

Postoperative Complications (short term):

- Hypotony (5 trans.) 6 (18.2%) eyes
- Choroidal detachment 4 (12.1%) eyes
- Hyphema 1 (3.0%) eye
- Decompression retinopathy 1 (3.0%) eye

Deep Sclerectomy in Uveitic Glaucoma

Postoperative Complications:

- Shallow / Flat A/C
- Exacerbation of inflammation

} None

Deep Sclerectomy in Uveitic Glaucoma

Postoperative Complications (long term):

- Cataract progression 9 (27.3%) eyes
- Hypotony maculopathy 1 (3.0%) eye

Results of Deep Sclerectomy in Uveitic Glaucoma

	Auer	Souissi	Arruabarena	Al Obeidan	Anand	Al Obeidan
No. of eyes	14	8	6	13	26	33
Mean F/U (months)	12	42.2	12	21	46.5	45.2
Complete success	45.4 %	50 %	66.7 %	84.6 %	73.1	72.7 %
Qualified success	45.4 %	37.5 %	33.3 %	7.7 %	15.4	21.2 %
Failure	9.2 %	12.5 %	0 %	7.7 %	11.5	6.1 %
Overall success rate	90.8 %	87.5 %	100 %	92 %	88.5	93.9 %

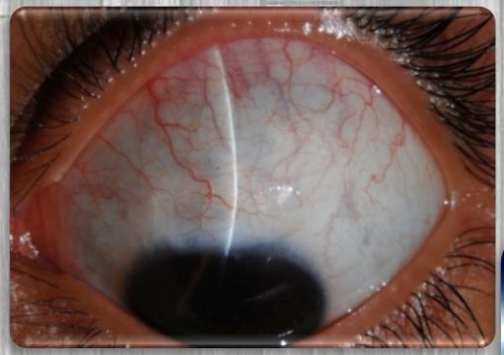
* ***No visually devastating complications***

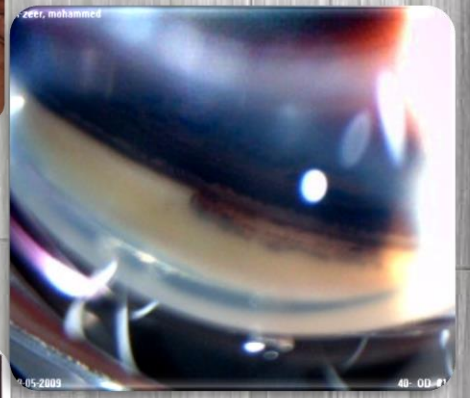
Auer et al. Klin Monatsbl Augenheilkd 2004; 221:339-42
Souissi et al. J Fr Ophthalmol 2006; 29:265-8
Arruabarrena et al. Arch Soc Esp Oftalmol 2007; 82:483-7
Al Obeidan et al. Int Ophthalmol 2008 (epub ahead of print).
Anand et al Eur J Ophthalmol 2011; 21 (6): 708-714
Al Obeidan et al. Ocular immunology and inflamation 2014

Deep Sclerectomy in Uveitic Glaucoma

Advantages of NPDS

- An extra-ocular procedure.
- Multi filtration routes.
- Bleb formation independent.



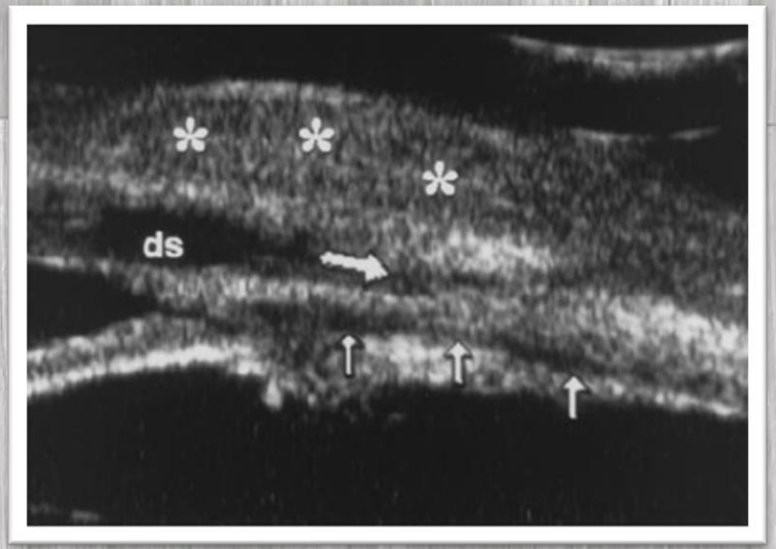


Deep Sclerectomy in Uveitic Glaucoma

Nonpenetrating deep sclerectomy (NPDS)

Routes of filteration

1. Subconjunctival
2. Intrascleral filteration
3. Subchoroidal (uveoscleral)
4. Schlem's canal ?



Deep Sclerectomy in Uveitic Glaucoma

Disadvantages of NPDS

- Longer learning curve.
- Open angle glaucoma.
- Need for frequent post-operative visits.

Deep Sclerectomy in Uveitic Glaucoma

Conclusions

- Glaucoma is a common and serious complication of uveitis.
- Glaucoma should not be an obstacle for aggressive treatment of intraocular inflammation.
- Deep sclerectomy is an **effective** procedure with **high safety profile** in open angle uveitic glaucoma.

Management

Control Inflammation

Undertreating

uveitis with corticosteroids to minimize IOP evaluation at the expense of good control of inflammation

a false economy

Management

Medical Therapy

- Beta-blockers
- CA inhibitors
- Adrenergic agonists
- Prostaglandin analogues ?
- Miotics - Avoid

Management

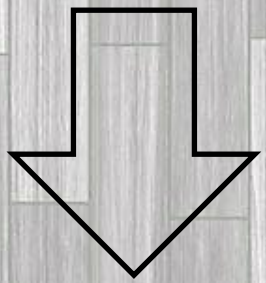
Surgical

- Laser therapy
  - Laser iridotomy (pupillary block)
  - ALT - ineffective (avoid it!)
- Filtering surgery
  - Trabeculectomy with antimetabolite
  - Non-penetrating glaucoma surgery
  - Tube surgery
  - Goniotomy
  - Cyclodestructive procedures

Management

Surgical

- Trabeculectomy with anti metabolites
  - Up to now is the procedure of choice
  - Success rates variable (30% - 78% after 5 years)



Hypotony & cataract formation were significant complications

Towler HMA et al.
Ophthalmology 2000;107:1822-28
Ceballos EM et al.
J Glaucoma 2002;11:189-196

Glaucoma Associated with Uveitis (Our Experience)

Prevalence: Over all 169/1220 (13.9 %)

Probability: Increases with time

5.5 (± 0.8)	at 1 Year of follow-up
14.6 (± 1.6)	at 3 Years of follow-up
23.1 (±2.4)	at 5 Years of follow-up
62.2 (±6.3)	at 10 Years of follow-up

Al-Rubaie et al.
under publication 2013


THANK
YOU!