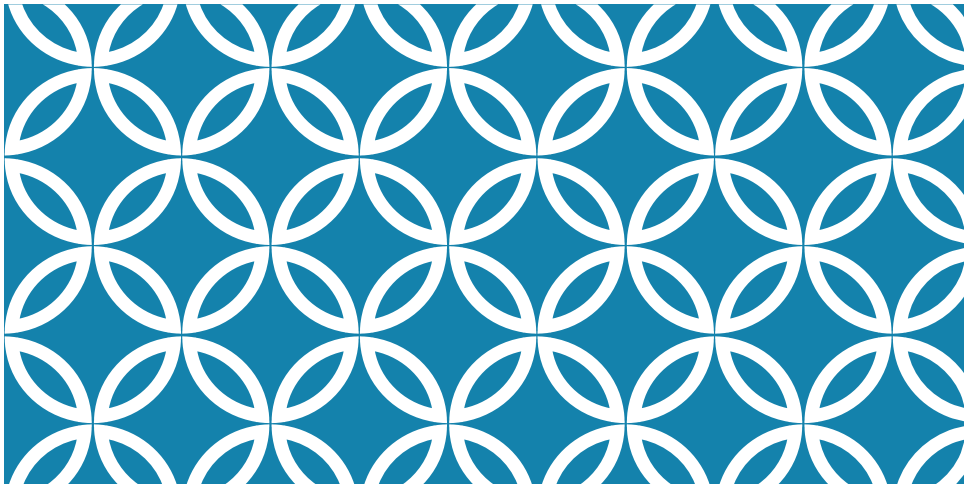

AHMED VALVE DEVICE IN PEDIATRIC REFRACTORY GLAUCOMA

Pr Mohamed Ali EL AFRIT

CHU LA RABTA. Tunisia

EOS 2019

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PEDIATRIC GLAUCOMA : DEFINITION

All Glaucoma in pediatric age (less than 18 years).

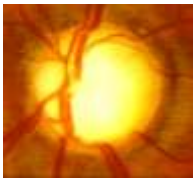
- Congenital/infantile Glaucoma
- Dysgenesic Glaucoma
- Glaucoma after Cataract surgery
- Uveitic Glaucoma
- Juvenile Glaucoma

2

MANAGEMENT OF PEDIATRIC GLAUCOMA

Diagnosis and therapeutic emergency: in Congénital Glaucoma

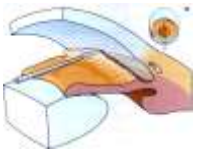
And relatively Less emergency : in Children



Surgical treatement is often necessary

3

SURGICAL MANAGEMENT OF PEDIATRIC GLAUCOMA



-Goniotomy

-Trabeculectomy

-Combined Trabeculectomy-Trabeculotomy

Have high success rates when performed as initial surgical procedure

But with these technics the results are poor in case of secondary refractory infantile glaucoma: like in some dysgenesis glaucoma:Sturge weber syndrom,Aniridia and after congenital cataract surgery

The use of Mitomycin C is very risky because of a lower scleral rigidity

4

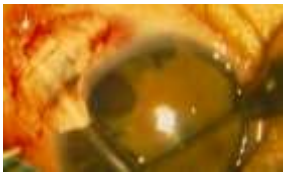
IN THE MANAGEMENT OF PEDIATRIC GLAUCOMA THERE IS A HISTORY OF MULTIPLE SURGERY

-Many surgery : for the same eye

-All diagnosis

Fibrosis +++

Refractory G : in young patients++



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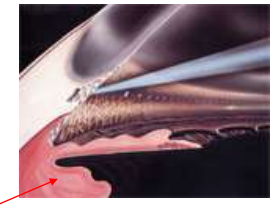
ALTERNATIVES

- techniques to produce weak ciliarybody

- Glaucoma Dainage Device(GDD)



Trans scleral cyclo-phtocoagulation

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DRAINAGE SYSTEMS

-TUBE

-VALVE reservoir : regulation system of aqueous humor against hypotony

7

DRAINAGE PROTHESIS

TUBES : - Schocket
- Molteno

VALVES : - Krupin
- Mendez
- Baerveldt
- **Ahmed.** +++

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AHMED VALVE DEVICE

-Invented by **Mateen AHMED**

In California

-F.D.A. agrement in 1993 . Ahmed valve :

- silicon tube : 25 mm .
- valve : elastomer membrane
  folded in 2
  with a concave polypropylen shell

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AHMED VALVE: PRESENTATION

16 mm, 13 mm , thickness : 1,9 mm

10mm-9,6 mm

S2 : 184 mm2

B1 : biplate : 364 mm2

S3 : 96 mm2

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AHMED VALVE: NEW PRESENTATION THE FLEXIBLES

FP7: 184 mm2

FP8 : 96 mm2

VALVE AND TUBE IN
SILICONE

FX1: 364 mm2

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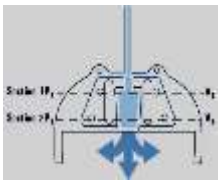
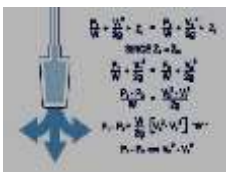
AHMED VALVE : PRINCIPLE

Pump type : with a Venturi flo

Elastomer Membrane folded in two .

Works like BERNOUILLI's principle.





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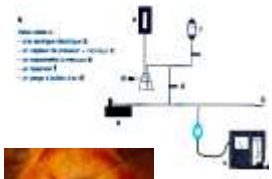
IN VITRO STUDY



EISENBERG, F MAY :in expertise

Study of different drainage prothesis :

-Only the Ahmed GV works really like a valve :

- Opening Pression of 13,6 mm and
- Closing Pression of 6,1 mm.

-The **Baerveldt** Implant and **Optimed** regulator works like a simple duct.

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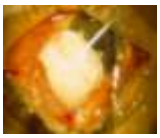
MATERIALS AND METHODS



Retrospective study

-**123 Pediatric Glaucoma,158 eyes**

-Mean follow up : 82,3 months ± 14,8

-April 1995 - December 2018

-Model of Ahmed valve G : S3,S2,FP7, FP8

The aim of the study:to discover the outcomes of AVG: efficacy,and safety

The purpose of the study was to assess the IOP control,changes in visual acuity,complications and risk factors of failure following the implantation of Ahmed glaucoma Valve(AGV) in eyes with pediatric glaucoma

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BREAKDOWN OF PEDIATRIC GLAUCOMA

-Primary congenital/infantile G : 53 eyes

-ICE syndrom : 12 eyes

-Rieger syndrom : 14 eyes

-Aniridia:8 eyes

-Peters syndrom:12 eyes

-Aphakic G: 13 eyes

-Pseudophakic G : 16 eyes

-Uveitic G : 9 eyes

-Juvenile G : 15 eyes

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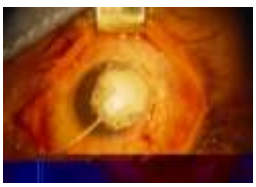
TECHNICAL SURGERY



-ANAESTHESIA, General anesthesia ++

-VALVE IMPLANTATION :FP7,FP8:

- **Temporal upper : 148 eyes**
- **Nasal: 10 eyes**

- Conjonctival flap 7 -10 mm to limbus
- Between rectus muscles: upper/ latéral
- scleral fixation .
- Tube in Anterior chamber through scleral flap (or patch).

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SUCCESS CRITERIONS OF GDD

IOP between 6 and 21 mm Hg at 2 successive visits without:

- other surgery or

- Decrease of Visual Acuity not more than 2 lines at Snellen scale neither loss of Light Perception

-Absence of important complication :

- Chronical hypotony

- Malignant Glaucoma, endophtalmitis; phthysis or corneal decompensation

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PRE AND PEROPERATIVE EXAMINATION

-Sexe,age,type of glaucoma

-Visual acuity when it's possible

-IOP measurement

-Gonioscopy,fundus evaluation

-previous surgery performed

-the model of AGV used and the quadrant of surgery

-The location of placement of the tube

-intraoperative sugery complications

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RESULTS

-AGE : 1-16 years

(mean=11,3 ± 4,8 years)

-Number of previous surgery : 2-6 :second intention surgery in all cases

-Number AGM : 3,58 ±1,2

-Preoperative IOP with treatment : 28 - 41 mm Hg

(mean = 34,9 ± 6,2 mm Hg)

-Postoperative IOP:6-18 mm Hg(mean=10,2 ± 4,5 mm Hg)

-Follow-up:1-23 years

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FUNCTIONAL RESULTS

102 Eyes : VA : stable

56 Eyes : VA : decrease

- 11 Eyes with an obturant cataract
- 17 Eyes : explanted
- 10 Eye (CG) : had loss LP

-1 case of endophtalmitis: strepotococcus

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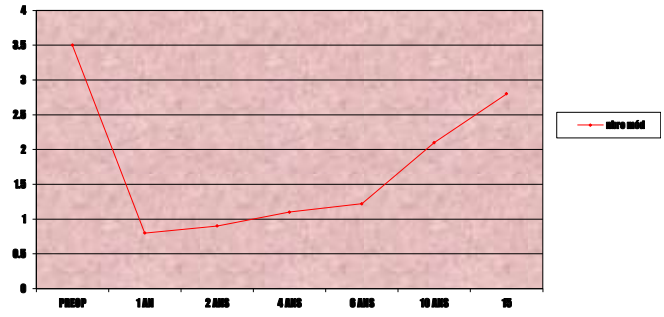
AVERAGE OF NUMBER OF GLAUCOMA MEDICATIONS



Very important increase of AGM number after the 5th year

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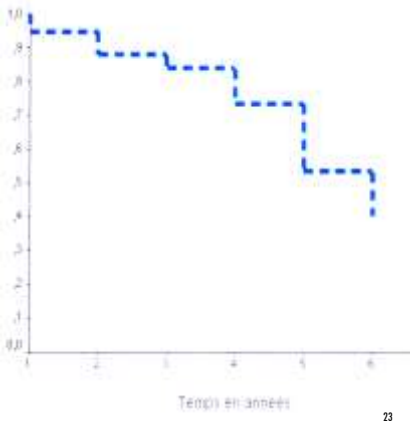
KAPLAN MEIER SUCCESS RATE WITH AHMED VALVE IN PEDIATRIC REFRACTORY GLAUCOMA IN OUR STUDY

Success rate:

- 1 year: 90,59%
- 2 years: 87;8%
- 3 years: 83,8%
- 4 years:63,3%
- **5 years:53,3%**
- 6 years:54,2%
- **10 years:34%**
- **23 years:23%**



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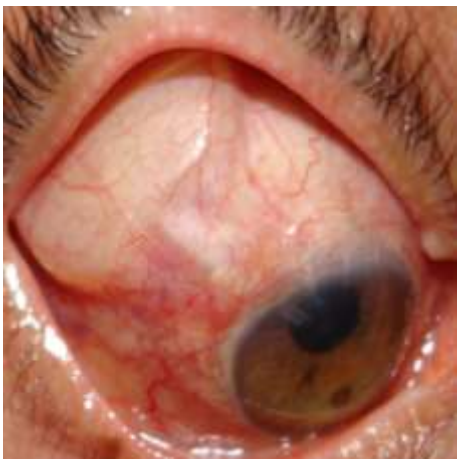
EVALUATION OF HYPERTONIC PHASE AFTER VALVE D'AHMED

CAPRIOLI

- **Hypertonic phase** after 5 weeks mean(3 at 6 weeks)
- Give a complementary treatment

In our study: **35% had an hypertonic phase** which was monitored with AGM



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COMPLICATIONS: EYES(54%)

-Hypotony:21,6%

-Tube obstruction :10,8%

-Fibrosis:10,8%

-Choroïdal detachement:5,4%

-Tube extrusion:5,4%

-Tube migration:2,7%

-Corneal decompensation :2,7%

-Hypheama:1,2%

Cataract:1,2%

Endophtalmitis:1 case

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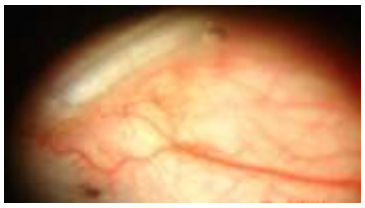
COMPLICATIONS

TUBE EXTRUSION



TENON CYST

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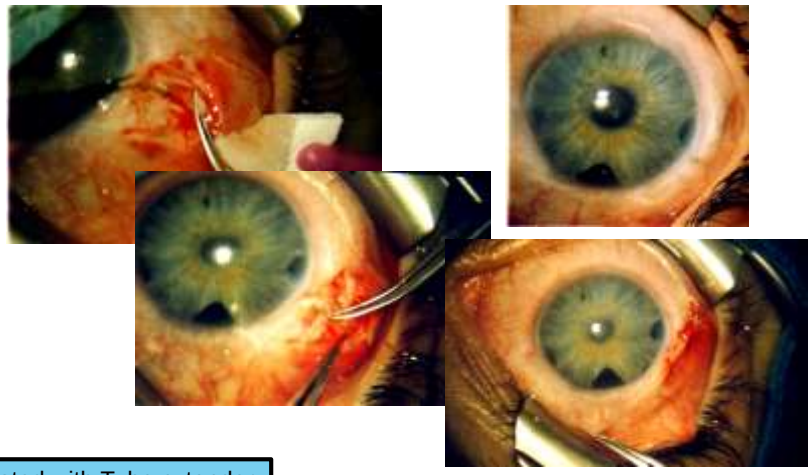
TUBE RETRACTION



Treated with Tube extender

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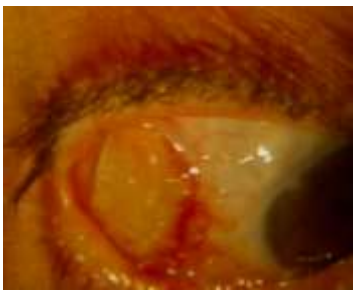
DISCOVERED VALVE

Discovered valve



Tube migration

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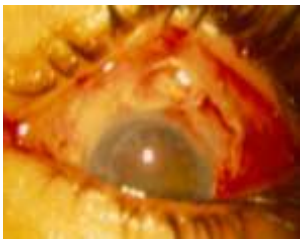
AHMED VALVE AND ET KP

Transitory corneal oedema

2 Cases after KP

COLEMAN : ↓ KP the success rate 20 - 30 %



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POST-OPERATIVE DIPLOPIA

One case of pseudo-Brown syndrom in upper nasal position

Near the optic nerve +++

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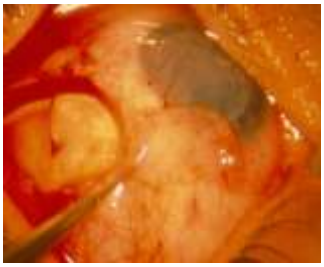
ENDOPHTALMITIS

- 1 Case endophtalmitis after discovered VA : streptococcus
- Any case of malignant glaucoma, or bulbar phthysis



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OTHER COMPLICATIONS IN LITERRATURE

- Decompression retinopathy
- Retinal detachement
- Iris blocking tube
- Endophtalmitis : 1,7 % streptococcus et haemophilus influenzae, children +++

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AHMED VALVE COMPLICATIONS:
LITTERATURE STUDY (60 - 448 EYES) .

choroidal effusion : 22-30 %

Athalamy : 12-23 %

Hyphoema : 15-19 %

tube misposition: 7-10 %

Hypotony : 3-6 %

Strabismus : 4-5 %

Expulsive : 5-6 %

Pupillar membrane:3-8 %

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HYPOTONY

Less frequent with Ahmed GDD : 8 - 13% Against:

-32 % : Baerveldt valve

-24 % : Krupin valve

-20 % : Molteno tube

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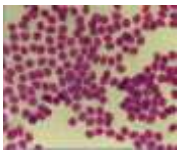
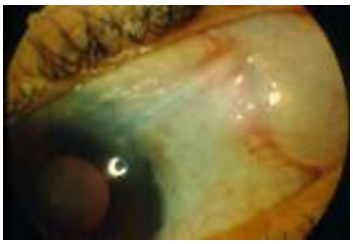
AHMED VALVE: REMEMBER THE CONJUNCTIVA REACTION

Safety but dont't forget that there is a conjunctival effraction and the classic problem of **fibrosis +++**





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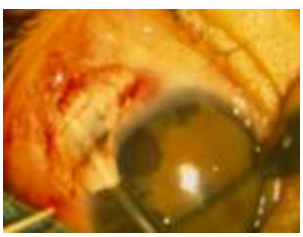
AHMED VALVE AND MITOMYCINE C

COSTA (Brasil) showed in a:

Double blind study that Mitomycine C didn't increase the success rate of Ahmed valve GDD



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SUCCESS RATE:COMPARATIVE RESULTS

Follow up	1 year	2 years	4 years	6 years	10 years
Ayyala	77 %				
Topouzis	87 %	82 %	76 %	76 %	
Coleman	78 %	68 %	65 %	60 %	
our study	75 %	73 %	67 %	**54 %**	**34 %**

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RECENT PUBLICATIONS ABOUT THIS SURGERY

Outcomes of Ahmed Glaucoma Valve Revision in Pediatric Glaucoma

CONCLUSION:

Although the short-term success rate of

AGV revision in children is high, with longer follow-up

the success rate decreases significantly. (Am J

Ophthalmol 2017;183:141–146. 2017 Elsevier Inc.

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Original Investigation

Valved Glaucoma Drainage Devices in Pediatric Glaucoma
Retrospective Long-term Outcomes

Andrew Chen, BS; Fei Yu, PhD; Simon K. Law, MD; JoAnn A. Giaconi, MD; Anne L. Coleman, MD, PhD; Joseph Caprioli, MD

Supplemental content at jamaophthalmology.com

IMPORTANCE Relatively little data exist about the long-term outcomes of an initial glaucoma drainage device (GDD) and subsequent GDDs implanted in pediatric patients with glaucoma.

OBJECTIVE To determine the long-term outcomes of the first and second GDDs and risk factors in pediatric glaucoma.

DESIGN, SETTING, AND PARTICIPANTS Retrospective review of 119 eyes of 89 patients younger than 18 years with glaucoma who underwent valved GDD implantation from March 1999 to April 2012 at the Stein Eye Institute, University of California, Los Angeles.

EXPOSURE Implantation of GDD, using silicone and polypropylene Ahmed glaucoma valve.

MAIN OUTCOMES AND MEASURES Kaplan-Meier survival analysis and risk factors associated with GDD failure. Success was defined as a final intraocular pressure of 5 to 21 mm Hg as well as a 20% reduction from baseline intraocular pressure with or without medications.

RESULTS The mean (SD) age at implantation of the first GDD was 6.8 (5.7) years. The mean (SD) follow-up time was 6.1 (3.3) years from surgery. The mean intraocular pressure was reduced by 13.0 mm Hg (95% CI, 8.8 to 17.2 mm Hg) at 3 years postoperatively. The mean number of glaucoma medications preoperatively vs postoperatively was not different starting at 5 years (reduction of 0.5; 95% CI, −0.1 to 1.0). The success rate at 5 years was 35.0% (95% CI, 46.0% to 65.9%). Risk factor analysis suggests that older age (risk ratio = 0.95; 95% CI, 0.90 to 0.99; $P = .02$), uveitic glaucoma (risk ratio = 0.34; 95% CI, 0.14 to 0.86; $P = .02$), and polypropylene GDDs (risk ratio = 0.39; 95% CI, 0.23 to 0.67; $P = .001$) were associated with higher success rates. Thirty-six eyes received a second GDD, with a mean (SD) of 2.2 (1.6) years between the 2 operations. The success rate 5 years after the second surgery was 52.8% (95% CI, 37.0% to 75.3%). Risk factors associated with failure of the first GDD were not found to affect the likelihood of failure for the second.

CONCLUSIONS AND RELEVANCE Glaucoma drainage devices, such as the Ahmed glaucoma valve, have moderate long-term success rates in pediatric patients with glaucoma. In pediatric patients, the first GDD is successful in 46% to 70% of patients at 5 years with medications, and the second GDD is successful in 27% to 75% of patients at 5 years after the subsequent surgery.

Author Affiliations: [illegible]

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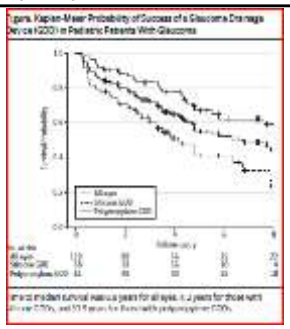
EPIDEMIOLOGY AND SUCCESS RATE

Patients characteristics

Glaucoma diagnosis	
Primary	34 (28.6)
Uveitic	26 (21.7)
Secondary	61 (51.3)
Implant type	
Silicone	55 (46.7)
Polypropylene	64 (53.3)
Age at implant surgery, mean (SD), y	
All eyes	6.8 (5.7)
By glaucoma diagnosis	
Primary	5.7 (5.3)
Uveitic	9.3 (5.8)
Secondary	7.7 (5.9)
Prior glaucoma surgery	55 (23.4)
Trabeculotomy	13 (10.9)
Trabeculectomy	9 (7.5)
Goniotomy	18 (15.1)
Nonglaucoma surgery	42 (35.0)

The success rates for all eyes were 85.7% (95% CI, 79.7%-92.2%) at 1 year and 36.8% (95% CI, 26.8%-50.4%) at 10 years



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The use of Ahmed glaucoma valve in the management of pediatric glaucoma

Shantha Balekudaru, DNB, Juhie Vadalkar, MS, Ronnie George, MS, and Lingam Vijaya, MS

PURPOSE To assess the intraocular pressure control (IOP), changes in visual acuity, complications, reoperation rates and risk factors for failure following Ahmed glaucoma valve implantation in pediatric eyes with glaucoma.

METHODS The medical records of consecutive patients with glaucoma who underwent Ahmed glaucoma valve implantation from January 2000 to December 2009) were retrospectively reviewed. Only one eye of each patient was included. Subgroup analysis was performed in three groups; group 1 included phakic eyes with primary congenital glaucoma, juvenile open-angle glaucoma, or glaucoma associated with ocular anomalies; group 2 included eyes with glaucoma in aphakia or pseudophakia; group 3 included eyes with other diagnoses. A successful outcome was defined as final IOP between 6 mm Hg and18 mm Hg without loss of light perception or reoperation for glaucoma.

RESULTS A total of 71 eyes in 71 patients: 15 (21%) in group 1, 47 (66%) in group 2, and 9 (13%) in group 3 were included Successful IOP control was achieved in 44 eyes of 44 patients (62%). Cumulative probabilities of success by Kaplan-Meier analysis at 12 and 24 months was 97% and 80% for the entire group, 100% and 82% for group 1, 95% and 86% for group 2, and 90% and 42% for group 3. Reoperation was necessary for 18 patients (25%), either for tube-related complications or for IOP control. The only significant risk factor for failure was the category of diagnosis ($P = 0.029$).

CONCLUSIONS Ahmed glaucoma valve implantation is an option in the management of pediatric glaucoma; however, reoperations for tube related complications or for persistent elevated IOP is frequently needed. (J AAPOS 2014;18:351-356)

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Table 1. Baseline demographics of patients

Characteristic	
Age, months	
Mean	82.07 ± 58.31
Median	72
Range	2-204
Male:female	40:31
OD:OS	36:35
Follow-up, months	
Mean	37.79 ± 32.11
Median	27
Range	3-126
Glaucoma diagnosis	
Primary congenital/developmental glaucoma/ JOAG/glaucoma associated with ocular anomalies (phakic eyes)	15 (21.1%)
Glaucoma in aphakia and pseudophakia	47 (66.1%)
Post-traumatic glaucoma	2 (2.8%)
Uveitic	3 (4.2%)
Secondary angle closure glaucoma	1 (1.4%)
Silicon oil induced glaucoma	3 (4.2%)
Prior surgeries, median (range)	2 (0-5)
Associated congenital anomalies	
Aniridia	4 (5.6%)
Peters anomaly	4 (5.6%)
Turner syndrome	1 (1.4%)
Microcornea and microphthalmos	3 (4.2%)
Choroidal coloboma	1 (1.4%)
Phacomatosis pigmento vascularis	1 (1.4%)
Congenital hereditary endothelial dystrophy	2 (2.8%)
Rubella	2 (2.8%)
Microspherophakia	1 (1.4%)
Corneal graft status	
Failed graft prior to surgery	8 (54%)
Clear grafts	7 (46%)

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Table 2. Details of previous glaucoma surgeries performed

Type of glaucoma surgery	Number (%)
External trab	4 (5.6)
External trab + trabe with MMC	4 (5.6)
Trabe with MMC, followed by at least one repeat trabe	24 (33.8)
External trab followed by at least one trabe	10 (14)
External trab + trabe with MMC followed by at least one trab	6 (8.4)
Diode cyclophotocoagulation	12 (16.9)

MMC, mitomycin C; *Trab*, trabeculotomy; *Trabe*, trabeculectomy.

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DISCUSSION

-Ocular hypertensive phase occured in 23 eyes (32%): mean IOP 29,3mmHg

Success rate: **54%-95%** have been reported this variation in surgical results the difference between the definition of success or failure and the population of patients.

The upper limit of IOP was not well defined

Also by the WGA World glaucoma association:21-18 or 12 mm Hg

- USE in this serie:of antifibrotic agents like Mitomycin C or Bevacizumab

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CONCLUSION : ADVANTAGES OF AHMED G VALVE

interesting alternative **in refractory pediatric glaucoma**

Technically simple : in one operatory time but

-Rares complications

-Success rate at 10 years : 34,5 % and only 23% at 23 years

-New tendency : first intention : in pediatric glaucoma : Coleman, Essayed

-Limits:Conjunctival effraction with a high rate of conjunctival complications

In our group, it is a second intention surgery and the conjunctiva was not well and often agressed in the past.

dont forget also that the sclera is thin in pediatric glaucoma population

- last: Expensive cost in our countries.

But in refractory pediatric glaucoma,Ahmed Glaucoma Device remain a good option when we cannot do anything else.

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