

Failed Angle Surgery: What next ? Trabeculectomy

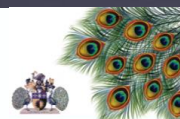


Egyptian Society of Glaucoma
19th Annual Meeting

Maria Papadopoulou
Glaucoma Service
MEH, London, UK



 Moorfields
Eye Hospital
NHS Foundation Trust



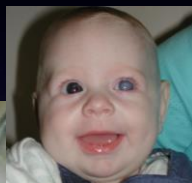
Angle Surgery

1942¹ Goniotomy

1st to significantly impact visual prognosis

1960^{2,3} Trabeculectomy

irrespective of corneal clarity



Goniotomy



Trabeculectomy

1. Barkan O. *Am J Ophthalmol* 1942
2. Smith R. *Br J Ophthalmol* 1960
3. Burian HM. *Am J Ophthalmol* 1960

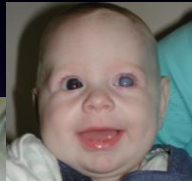
Angle Surgery

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Goniotomy

Trabeculotomy

≈ 120° incision (often needs to be repeated)

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Angle Surgery

1942¹ Goniotomy

1st to significantly impact visual prognosis

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irrespective of corneal clarity

2010⁴ 360° Trabeculotomy
illuminated microcatheter

once, safe, more successful



iTrack

1. Barkan O. *Am J Ophthalmol* 1942
2. Smith R. *Br J Ophthalmol* 1960
3. Burian HM. *Am J Ophthalmol* 1960

4. Beck AD, Lynch MG. *Arch Ophthalmol* 1995

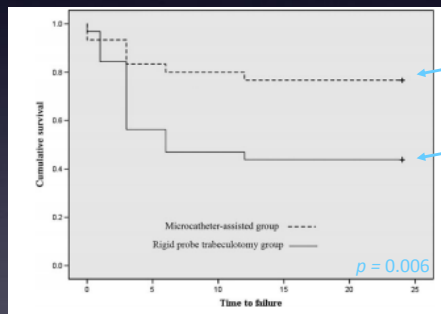
360 vs probe Trabeculotomy

Prospective Outcomes (2 yrs)

Two-year results of microcatheter-assisted trabeculotomy in paediatric glaucoma: a randomized controlled study

Yasmine El Sayed and Ghada Gawdat
Cairo University Faculty of Medicine, Cairo, Egypt

62 PCG Egyptian infant eyes



	360 TrabO	77%	Further glaucoma surg
			10%
	probe TrabO	43%	41%

ElShayed Y, Gawdat G. *Acta Ophthalmol* 2017

Failed Angle Surgery

Risk factors

- Diagnosis ↓ success: Secondary childhood glaucoma compared to PCG ¹

1. Rice NSC. The surgical management of congenital glaucoma. *Acta Ophthalmol* 1977

Failed Angle Surgery

Risk factors

- **Diagnosis** ↓ success: Secondary childhood glaucoma compared to PCG ¹
- **Age** ↓ success: neonatal and late onset PCG ²

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2. Shaffer RN. *Trans Am Ophthalmol Soc* 1982

Failed Angle Surgery

Risk factors

- **Diagnosis** ↓ success: Secondary childhood glaucoma compared to PCG ¹
- **Age** ↓ success: neonatal and late onset PCG ²
- **Severity** ↓ success: more immature angle ^{3,4} and larger ocular dimensions ⁵

1. Rice NSC. The surgical management of congenital glaucoma. *Aust J Ophthalmol* 1977
2. Shaffer RN. *Trans Am Ophthalmol Soc* 1982
3. Anderson DR. *Ophthalmology* 1983

4. Al-Hazmi A et al. *British J Ophthalmol* 2005
5. Papadopoulos M et al. *WGA Consensus Series* 9 2013

Failed Angle Surgery

Risk factors

- Diagnosis ↓ success: Secondary childhood glaucoma compared to PCG ¹
- Age ↓ success: neonatal and late onset PCG ²
- Severity ↓ success: more immature angle ^{3,4} and larger ocular dimensions ⁵
- Geography ↓ success Middle East^{4,6} & India⁷ → preference CTT initial surgery
Race

1. Rice NSC. The surgical management of congenital glaucoma. *Aust J Ophthalmol* 1977
2. Shaffer RN. *Trans Am Ophthalmol Soc* 1982
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4. Al-Hazmi A et al. *British J Ophthalmol* 2005
5. Papadopoulos M et al. *WGA Consensus Series* 9 2013
6. Elder MJ. *BJO* 1993

7. Mandal AK. *Indian J Ophthalmol* 1993

Failed Angle Surgery

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Race
- Genetics ⁸
- Family History ⁹

1. Rice NSC. The surgical management of congenital glaucoma. *Aust J Ophthalmol* 1977
2. Shaffer RN. *Trans Am Ophthalmol Soc* 1982
3. Anderson DR. *Ophthalmology* 1983

4. Al-Hazmi A et al. *British J Ophthalmol* 2005
5. Papadopoulos M et al. *WGA Consensus Series* 9 2013
6. Elder MJ. *BJO* 1993

7. Mandal AK. *Indian J Ophthalmol* 1993

8. Al-Shahrami NO, Khan AO. *Ophthalmic Genet* 2017
9. Lister A. *Trans Ophthalmol Soc UK* 1966

Failed Angle Surgery

Options

- Trabeculectomy
- Glaucoma drainage device (GDD) surgery
- (Cyclodestruction – usually reserved if angle + other surgery failed)

Failed Angle Surgery

Options

- Trabeculectomy
- Glaucoma drainage device (GDD) surgery
- (Cyclodestruction – usually reserved if angle + other surgery failed)

- No prospective, comparative studies

- Choice is determined by surgeon's experience, likelihood of follow up, geographic location & availability and cost of GDDs

Failed Angle Surgery

Options

- Significant worldwide variation

Failed Angle Surgery

Options

- Significant worldwide variation
- World Glaucoma Association Childhood Glaucoma Surgery survey¹

PCG <u>First line:</u>	69% angle surgery
Goniotomy	28%
Probe trabO	28%
360 trabO	13%
(CTT	13%)

Failed Angle Surgery

Options

- Significant worldwide variation
- World Glaucoma Association Childhood Glaucoma Surgery survey¹

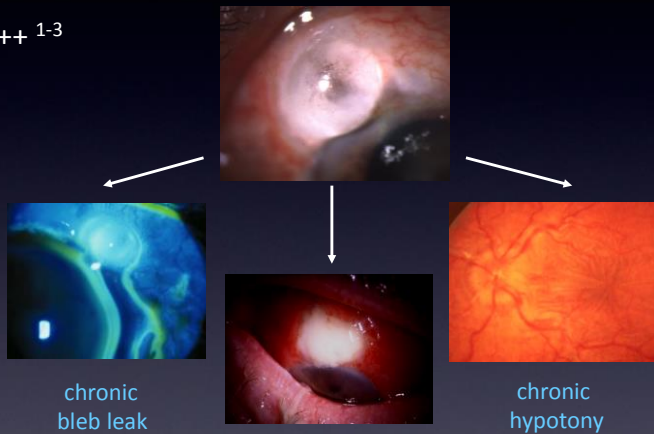
PCG	<u>First line:</u>	69% angle surgery	<u>Failed angle surgery</u>
	Goniotomy	28%	Repeat angle surgery 51%
	Probe trabO	28%	Trabeculectomy 22% (62%)
	360 trabO	13%	GDD surgery 15%
	(CTT	13%)	Other 11%

1. Papadopoulos M et al. Glaucoma surgery in children. In Childhood Glaucoma. WGA Consensus Series - 9. 2013

Paediatric MMC Trabeculectomy

Traditionally

- Complications +++¹⁻³



1. Sidoti PA et al. Ophthalmology 2000
 2. Freedman S et al. J AAPOS 1999
 3. Susanna et al. J Glaucoma 1995

Paediatric MMC Trabeculectomy

Traditionally

- Complications +++¹⁻³
- Lower success in infants vs older children (30% vs 73%)²⁻⁴

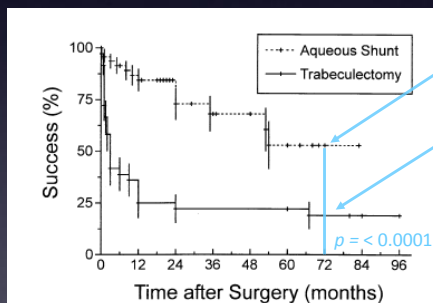
1. Sidoti PA et al. Ophthalmology 2000
2. Freedman S et al. JAAPOS 1999
3. Susanna et al. J Glaucoma 1995

4. Al-Hazmi et al. Ophthalmology 1998

Paediatric MMC Trabeculectomy

Traditionally

- Complications +++¹⁻³
- Lower success in infants vs older children (30% vs 73%)²⁻⁴
- Lower success in infant MMC trabs vs tubes⁵



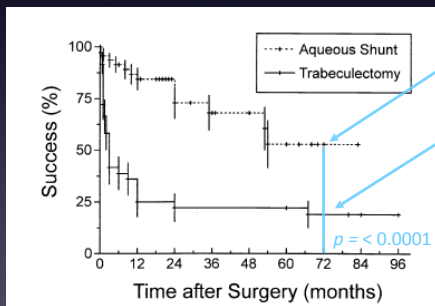
1. Sidoti PA et al. Ophthalmology 2000
2. Freedman S et al. JAAPOS 1999
3. Susanna et al. J Glaucoma 1995

4. Al-Hazmi et al. Ophthalmology 1998
5. Beck AD et al. Ophthalmology 2003

Paediatric MMC Trabeculectomy

Traditionally

- Complications +++ 1-3
- Lower success in infants vs older children (30% vs 73%) 2-4
- Lower success in infant MMC trabs vs tubes 5



Tubes 53% 46% ≥ 1 op for complication
35% tube repositioning

Trab MMC 19%

1. Sidoti PA et al. Ophthalmology 2000
2. Freedman IS et al. JAAPOS 1999
3. Susanto et al. J Glaucoma 1995

4. Al-Hazmi et al. Ophthalmology 1998
5. Beck AD et al. Ophthalmology 2003

Paediatric GDDs

Pediatric Glaucoma Surgery

A Report by the American Academy of Ophthalmology

Teresa C. Chen, MD,¹ Philip P. Chen, MD,² Brian A. Francis, MD,³ Anna K. Junk, MD,⁴
Scott D. Smith, MD, MPH,⁵ Kuldev Singh, MD, MPH,⁶ Shan C. Lin, MD,⁷ Ophthalmology 2014;121:2107-2115

- Consistently reported more commonly in children vs adults
 - tube malposition, migration (requiring surgery 33% cases)
 - tube erosion (up to 11%)
 - endophthalmitis (up to 10%)
- “Noteworthy that many children require IOP lowering meds after tube surgery.”



GDD tube & plate erosion

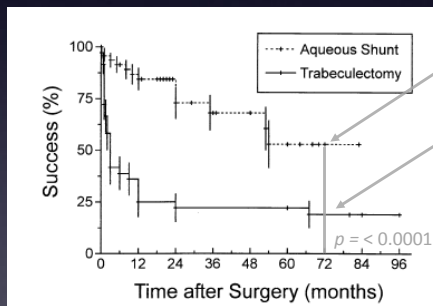


Corneal decompensation following GDD

Paediatric MMC Trabeculectomy

Traditionally

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Tubes 53% 46% ≥ 1 op for complication
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Trab MMC 19%

BUT, overall paediatric Trab MMC vs Tubes⁶

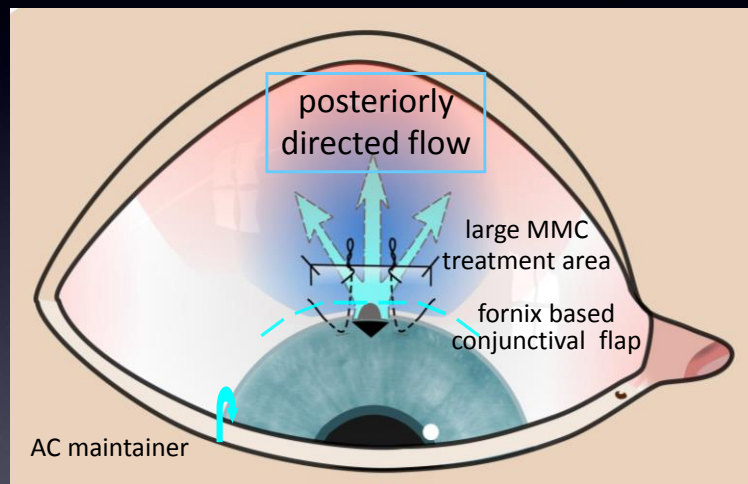
- lower mean IOP
- less dependent on meds for IOP control

1. Sidoti PA et al. Ophthalmology 2000
2. Friedman IS et al. JAAPOS 1999
3. Susanna et al. J Glaucoma 1995

4. Al-Hazmi et al. Ophthalmology 1998
5. Beck AB et al. Ophthalmology 2003
6. Beck AB et al. Am J Ophthalmol 1998

Paediatric MMC Trabeculectomy

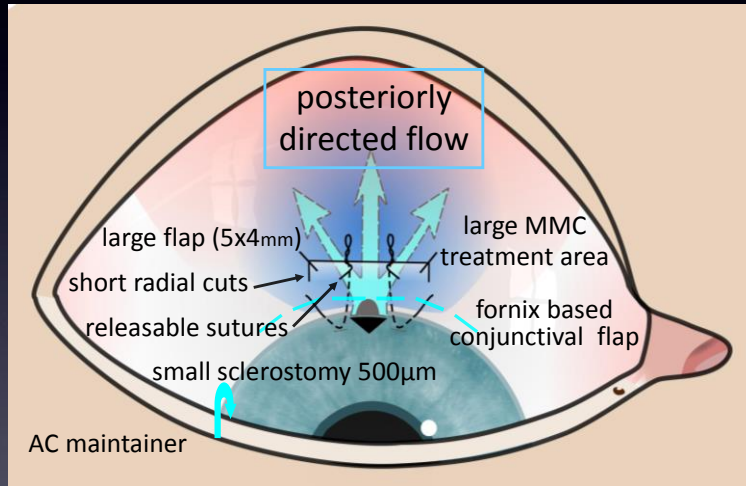
Contemporary



Moorfields Safer Surgery System (1999)

Paediatric MMC Trabeculectomy

Contemporary



Moorfields Safer Surgery System (1999)

Paediatric MMC Trabeculectomy

Contemporary

Cystic Bleb Formation and Related Complications in Limbus- versus Fornix-Based Conjunctival Flaps in Pediatric and Young Adult Trabeculectomy with Mitomycin C

Ophthalmology 2003;110:2192-2197

Anthony P. Wells, FRANZCO,¹ M. Francesca Condino, PhD, FRCOphth,¹ Casey Bance, MBBS,² Peng T. Khaw, PhD, FRCOphth¹



Risk of cystic bleb formation	29 %
Bleb related problems	0.5 %
leaks/blebitis/endophthalmitis (5 yrs)	

Paediatric MMC Trabeculectomy

Contemporary

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Anthony P. Wells, FRANZCO,¹ M. Francesca Conderio, PhD, FRCOphth,¹ Casey Bance, MBBS,² Peng T. Khaw, PhD, FRCOphth¹



Risk of cystic bleb formation	29 %	90 %
Bleb related problems leaks/blebitis/endophthalmitis (5 yrs)	0.5 %	20 %

Paediatric MMC Trabeculectomy in Infants

Long-Term Outcomes of Trabeculectomy Augmented with Mitomycin C Undertaken within the First 2 Years of Life



Hari Jayaram, PhD, FRCSEd,^{1,2,3} Richard Scutern, FRCOphth,¹ Francisco Pooley, MD,^{1,4} Mark Chiang, MBBS, FRANZCO,^{1,2,5} Casey Bance, MSc, DSc,^{2,6} Nicholas G. Strouthidis, PhD, FRCOphth,^{1,2,7,8} Peng Tee Khaw, PhD, FRCOphth,^{1,2} Maria Papadopoulos, MBBS, FRCOphth^{1,2}



- Retrospective, single surgeon (MP)
- Moorfields SSS technique
- MMC 0.1-0.5mg/ml (3 mins) subconj and under scleral flap (Sno*strip)*

Paediatric MMC Trabeculectomy in Infants

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- Retrospective, single surgeon (MP)
- Moorfields SSS technique
- MMC 0.1-0.5mg/ml (3 mins) subconj and under scleral flap (Sno*strip)*
- EUA at 1,3 and (6) weeks postop (5FU + Betnesol injections as necessary)
- Dexamethasone 4-8 x/day, Maxitrol ointment weaned over 3-4 months

1. Jayaram H et al. Long term outcomes of trabeculectomy augmented with MMC undertaken within the first 2 yrs of life. *Ophthalmology* 2015

Paediatric MMC Trabeculectomy in Infants

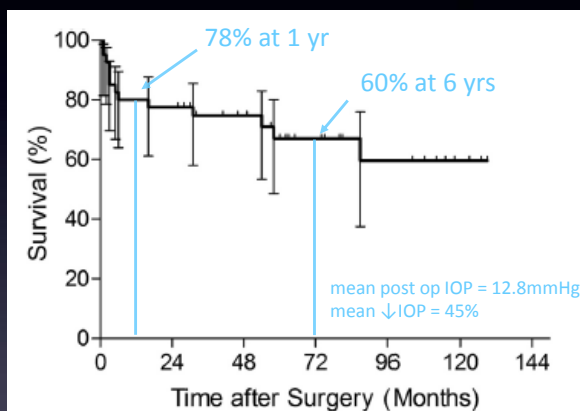


Figure 1. Kaplan-Meier life table analysis showing cumulative surgical success after mitomycin C-augmented trabeculectomy in infants. Plotted is

40 phakic eyes

80% PCG failed goniotomy

Failed cases

all uncontrolled IOP

Successful cases

96% off meds

44% 6/12 or better

1/40 cystic bleb

1. Jayaram H et al. Long term outcomes of trabeculectomy augmented with MMC undertaken within the first 2 yrs of life. *Ophthalmology* 2015

Paediatric MMC Trabeculectomy in Infants

Complications

	Jayaram et al (MEH) ¹	Beck et al ²
Choroidal effusions	4 / 40 (10%)*	4 / 24 (16.7%)
Chronic hypotony	0/40	1 / 24 (4%)
Late bleb leak	0 / 40	3 / 24 (12.5%)
Bleb related infection	1 / 40 (2.5%) blebitis	2 / 24 (8%) endophthalmitis
Corneal decompensation	0 / 40	2 / 24 (8%)
Cataract	3/26 (11.5%)	2 / 24 (8%)

* All 4 cases of effusions had successful outcome (3 AC viscoelastic inj)

1. Jayaram H et al. Long term outcomes of trabeculectomy augmented with MMC undertaken within the first 2 yrs of life. *Ophthalmology* 2015

2. Beck AD, Freedman S, Kemmer J, Jin J. Aqueous shunt devices compared to Trabeculectomy with MMC for children in 1st two years of life. *Ann J Ophthalmol* 2003

Failed Angle Surgery: Trabeculectomy

Conclusions

- Contemporary Paediatric Trabeculectomy technique
 - Should be considered regardless of age in phakic patients
 - Long term success with low target IOPs possible
 - Good visual outcomes
 - ↓ Complications including endophthalmitis
 - ↓ Medications
 - Cheap compared to tube surgery

