

# Medial Rectus Pulley Sutures: Update 2010

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# New Times. Old Problem

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- Convergence excess ET
  - ET 25      ET' 35
  - [nearly] everyone BMR 5mm
  - ET 35      ET' 50.....6mm
  - **ET 15              ET' 50**
  - *What surgical dosage BMR?*



# Scleral Posterior Fixation Suture

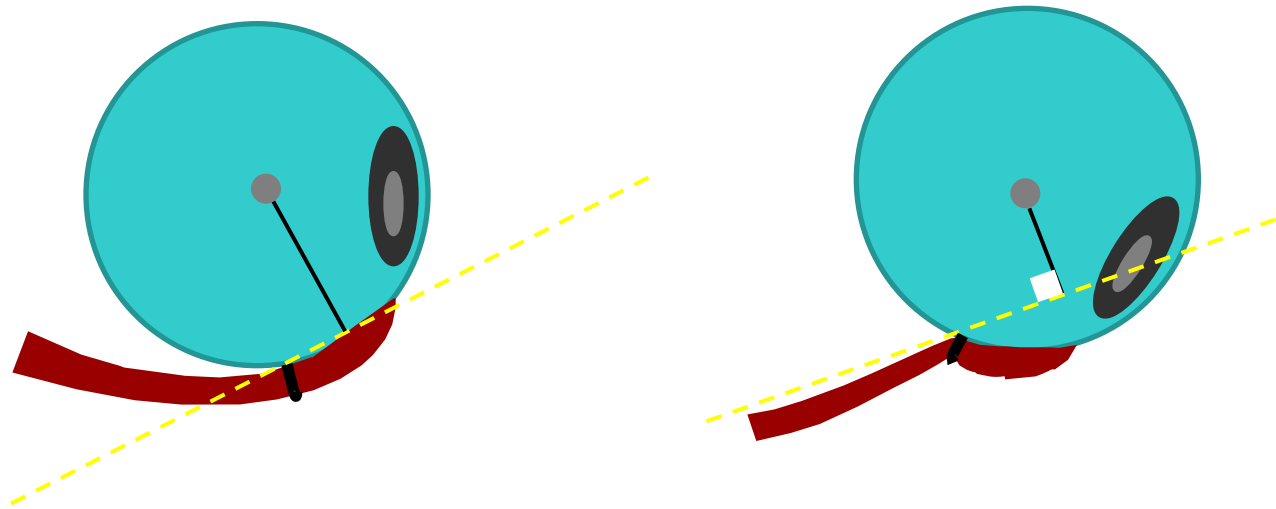
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- Cüppers 1976
- Became known as “Faden” suture
- Attaches rectus muscle to globe 12-14mm behind insertion
  - Medial rectus – convergence excess
  - Superior rectus – DVD
- Limits effect of muscle in its field of action
  - Minimal effect on primary position



# Scleral Posterior Fixation Suture

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- Preventing arc of muscle contact from unravelling decreases moment arm and thus torque acting on muscle

# Scleral Posterior Fixation Suture

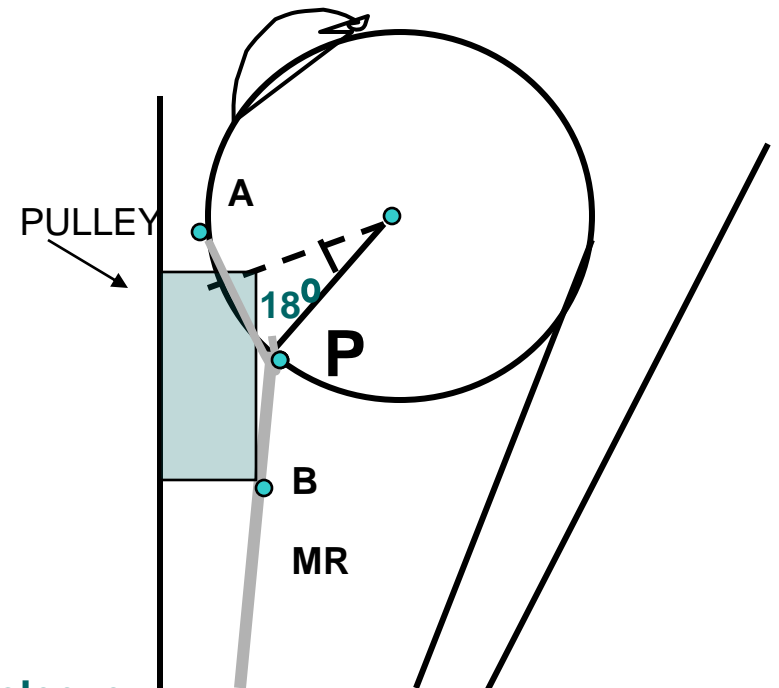
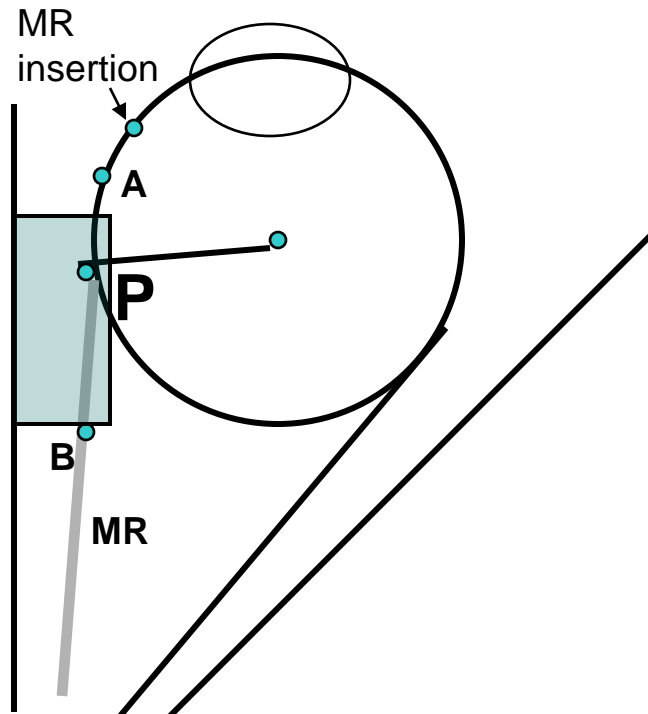
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- Forced duction test post-Faden
  - **Sutured muscle is tight**
- Change of lever arm is not the only effect
- **Clark, Demer**
- **Posterior fixation sutures: a revised mechanical explanation for the fadenoperation**
- **Am J Ophth 1999**



# Faden Suture

- Restriction thus explained



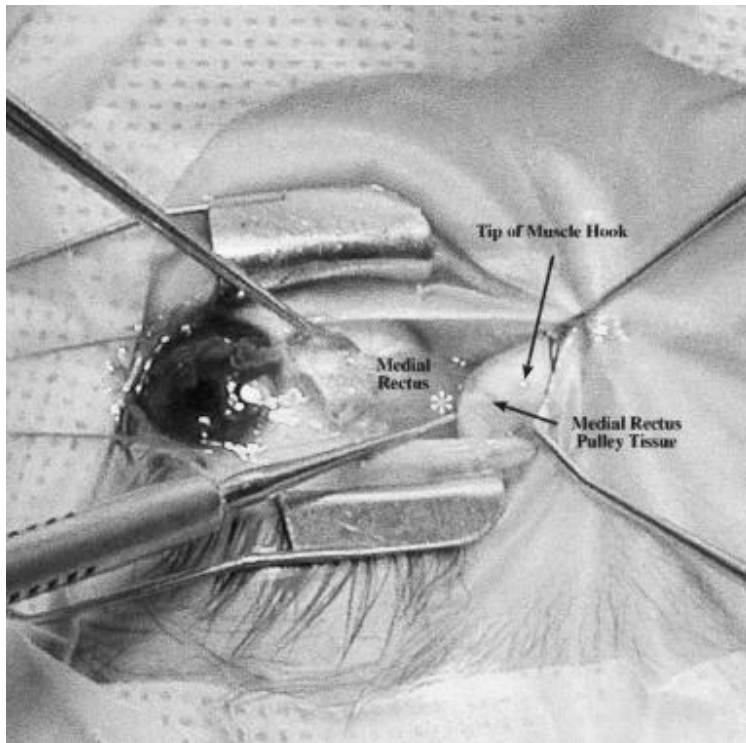
A, B : ant & post extent of pulley sleeve



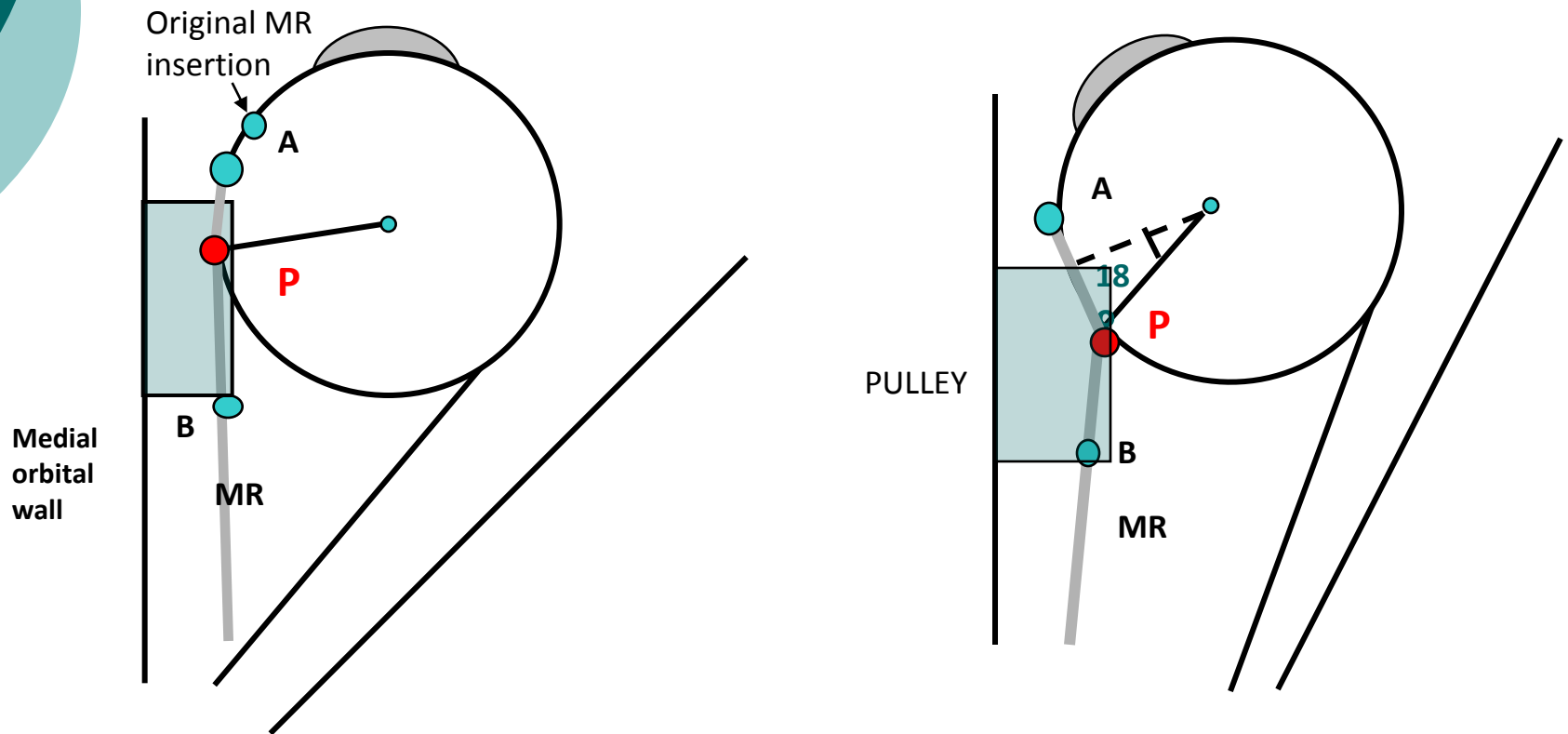
# Medial Rectus Pulley Suture

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- Clark, Ariyasu and Demer
  - American Journal Ophthalmology, June 2004



# Medial Rectus Pulley Suture





# Medial Rectus Pulley Suture

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- 22 pts: acquired ET with high AC/A ratio
  - 9 scleral fixation
    - Mean F/U 22 months
    - Mean near excess decreased from 16.2<sup>^</sup> to 4.4<sup>^</sup>
    - 1 under-correction (didn't have BMR)
  - 13 "pulley posterior fixation"
    - Mean F/U 9.7 months
    - Mean near excess decreased from 16.8<sup>^</sup> to 2.5<sup>^</sup>
    - 1 over-, 1 under-correction (didn't have BMR)
- No significant differences between groups apart from F/U



# Pulley Suture Article #2

## JAAPOS 2004

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- Recurrent ET
  - Near excess decreased from 12.1<sup>^</sup> to 1.3<sup>^</sup>
- Sensory ET
  - 2 over-corrections
    - ?poor measurements
    - ?enhanced effect of LR resect combined with pulley suture
      - Recommend decrease MR dose in this setting



# Melbourne Experience

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- Lionel Kowal performing MR pulley fixation suture surgery from late 2006
  - Invaluable guidance/advice from Joe Demer
  
- 44 cases thus far  
EW: n=2



## 3 key slides

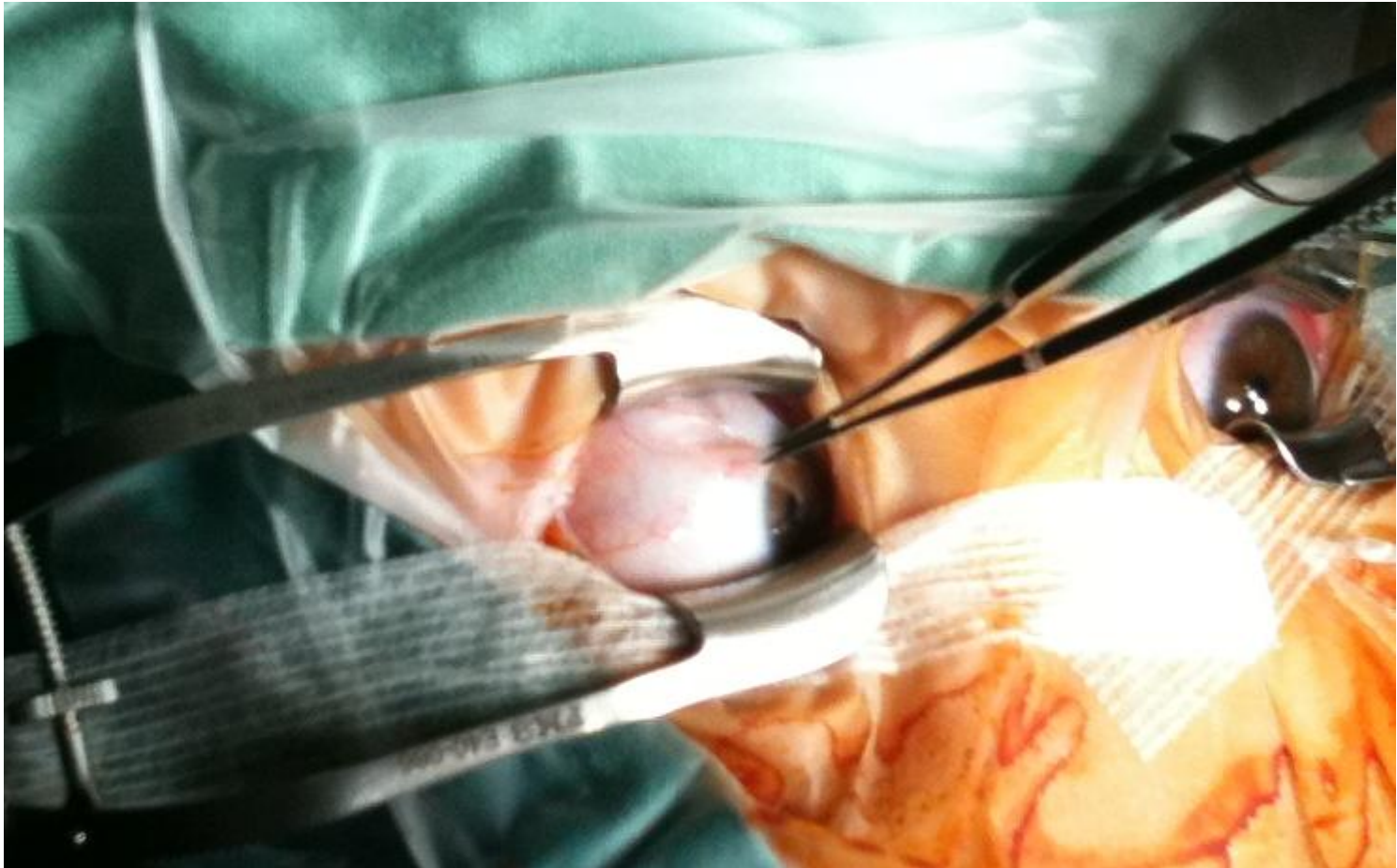
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- 1. forced duction test to show that there is no restriction of MR
- 2. measure distance from lateral limbus to caruncle
- 3. repeat measurement after MR pulley placed



# Melbourne Experience: Surgical technique

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Forced duction test to show that there is no restriction of MR



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# Melbourne Experience: Surgical technique

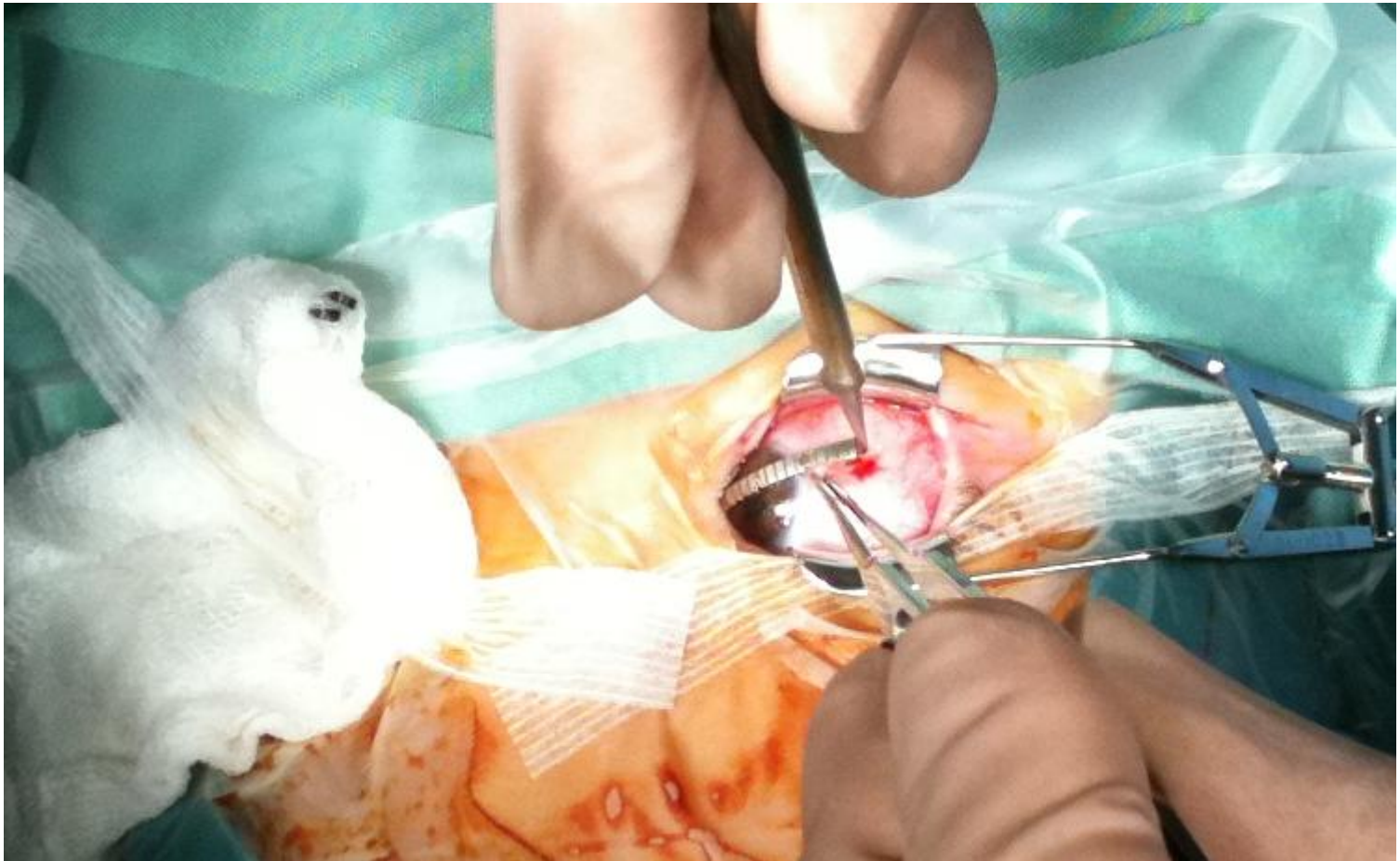


Measure distance from  
lateral limbus to caruncle



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# Melbourne Experience: Surgical technique



Repeat measurement after MR pulley placed



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# Melbourne Experience: Checking restriction produced

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- 26/44 with restriction check
- Average (when measured) 3.2mm
  - increase in distance from temporal limbus to caruncle on adduction





# Melbourne Experience: Surgical technique

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- Pulley final copy 2 wmv



# Melbourne Experience: Patient characteristics

<b>Convergence excess</b>		25
<b>Aim: spectacle independence</b>		16
	Low hyperopia	9
	D=N with bifocals	4
	Spectacle intolerance	3
<b>Variable ET</b>		4
	Infantile ET	3
<b>Sensory ET</b>		2
<b>Recurrent ET</b>	Addition to previous BMR	3

- NB some overlap between groups

# Melbourne Experience: Pre-operative details

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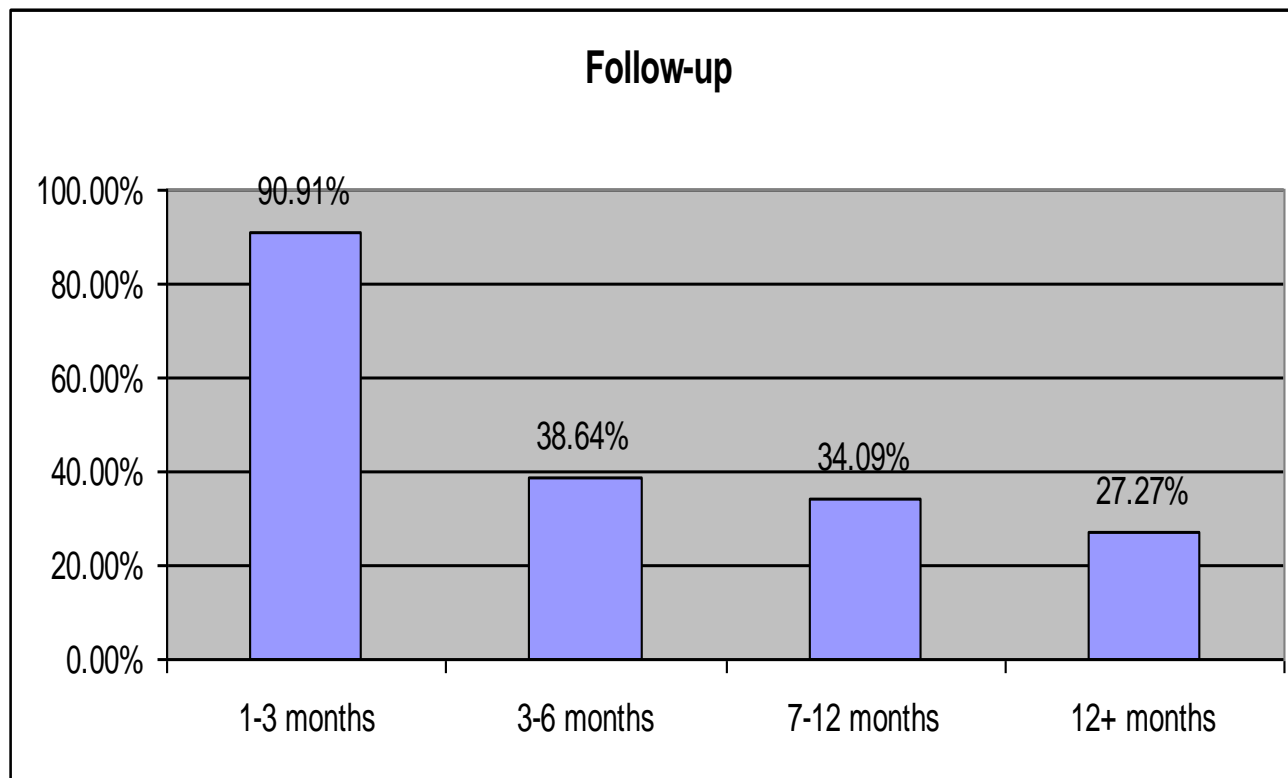
- For n=44

	<b>Mean</b>	<b>Range</b>
<b>Age at surgery (yrs)</b>	6.0	(0.6 – 23.7)
<b>Follow-up (months)</b>	8.6	(0 – 28.1)
<b>N&gt;D disparity (<math>\Delta</math>)</b>	20.9	(-5 – 65)



# Melbourne Experience: Follow-up

○ For n=44



# Melbourne Experience: Outcome measures

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○ For n=44

<b><math>\Delta</math></b>	<b>CT D (with best available correction)</b>	<b>N-D</b>	<b><math>\Delta</math>N-D</b>
<b>1-3 months</b>	1.3	6.6	-13.8
<b>4-6 months</b>	4.1	4.1	-13.4
<b>12+ months</b>	3.8	0.7	-22.3



# Melbourne Experience: Outcome measures

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- For n=44
  - Over-corrections
    - At 1-3 months: 4 (10%)
    - At 4-6 months: 2 (11.8%)
    - At 7+ months: 0
    - At final follow-up: 3 (6.8%), 1 > 10<sup>XT</sup>
  - Technical failures
    - 4 pulley sutures unable to be placed (4 eyes, 4 pts)
      - Used Faden in 2 cases, (unplanned) unilateral pulley sutures in 1 case, and no fixation suture in 1 case
    - 2 patients required further surgery
      - At one month and seven months



# Melbourne Experience: Pre-operative details

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- For convergence excess cases (n=25)

	<b>Mean</b>	<b>Range</b>
<b>Age at surgery (yrs)</b>	5.4	(1.8 - 11.0)
<b>Follow-up (months)</b>	8.9	(0.1 - 28.1)
<b>N&gt;D disparity (<math>\Delta</math>)</b>	23	(6 - 47)

# Melbourne Experience: Surgical details

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- For convergence excess cases (n=25)
  - All underwent BMR recessions
    - Mean 4.85 mm
    - General dose = for average of near and distance deviations
  - All underwent bilateral pulley sutures
    - Except one technical failure
      - Scleral Faden placed left eye, pulley suture right eye
      - Straight at near and distance at 3 months





# Melbourne Experience: Outcome measures

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- For convergence excess cases (n=25)

Units = Prism dioptries	CT D (with best available correction)	N-D	$\Delta$ N-D
1-3 months	-0.2	7.4	-14.7
4-6 months	4.6	3.6	-17.4
12+ months	4.0	0.8	-19.7

# Melbourne Experience: Outcome measures

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- For convergence excess cases (n=25)
  - 7 (28%) had bifocals pre-operatively
    - 3 (43%) were able to discontinue bifocal wear during follow-up period
  - 1 (5.6%) required bifocals post-operatively, when not required pre-operatively



# Melbourne Experience: Outcome measures

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- For convergence excess cases (n=25)
  - Over-corrections
    - At 1-3 months: 3 (12.5%)
    - At 4-6 months: 2 (25%)
    - At 7+ months: 0
    - At final follow-up: 2 (8%), 1 > 10<sup>^</sup>XT



# Melbourne Experience:

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- For variable esotropia patients (n=4)
  - 3 infantile esotropia
  - Variability or difficulty assessing deviation reliably = common feature



# Pulley Posterior Fixation Suture

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- Logical application of current understanding of orbital anatomy
- Safe
- Effective at decreasing near excess
  - $\Delta$  12-17<sup>^</sup>
- Low risk significant over-correction ( $\leq 3\%$ )
- Technically difficult
- Probably not effective as isolated procedure



# The Future

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- Long-term follow-up?
- Is titratability possible?
- Role of intraoperative restriction?

