

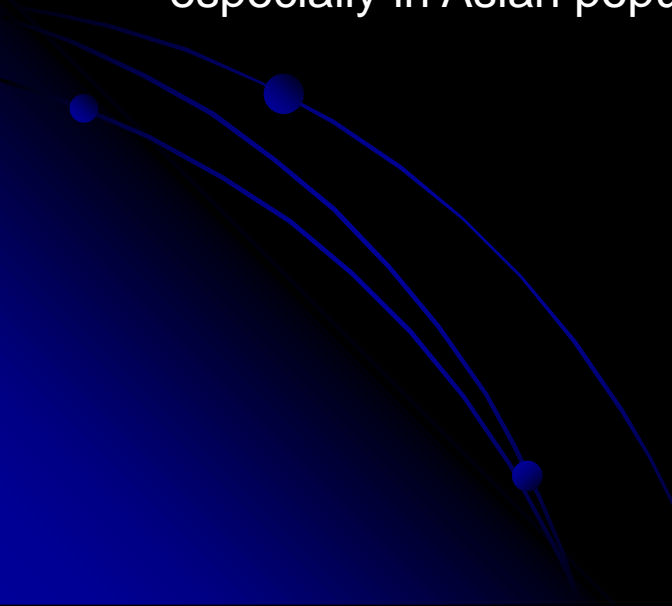
Tissue Plasminogen Activator and Pneumatic Displacement in Treatment of Submacular Hemorrhage

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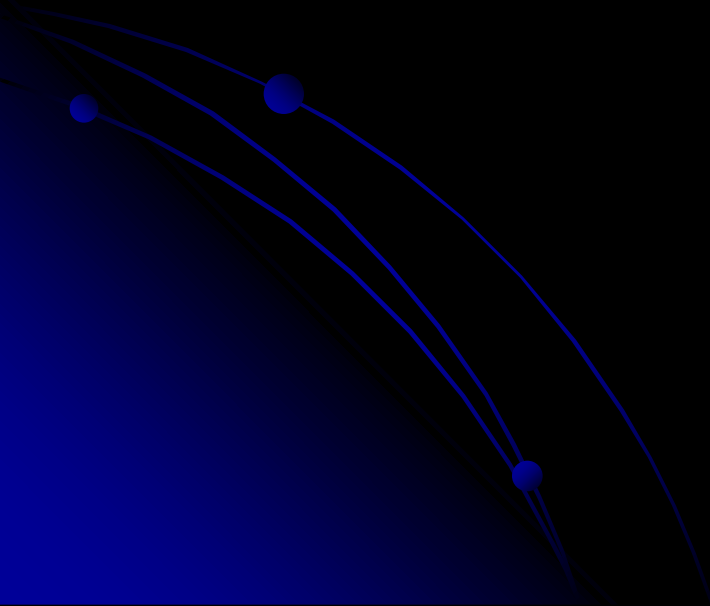
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The authors have no financial or proprietary interests in the subject of this presentation.

Background

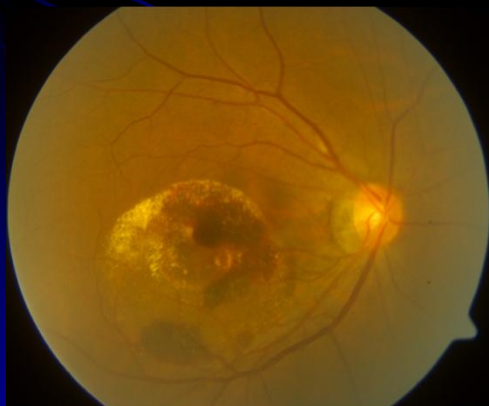
- ❖ **Submacular hemorrhage** is a major cause of acute visual loss, which is potentially sight threatening.
 - ❖ **Intravitreal tissue plasminogen activator (tPA)** and **injection of expansile gas** has been used in the treatment of submacular hemorrhages. The tPA lyses the blood clot and the intraocular gas pneumatically displaces the blood away from the fovea.
 - ❖ Currently, there are **few studies** on the efficacy and safety of this technique, especially in Asian populations.
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Objectives

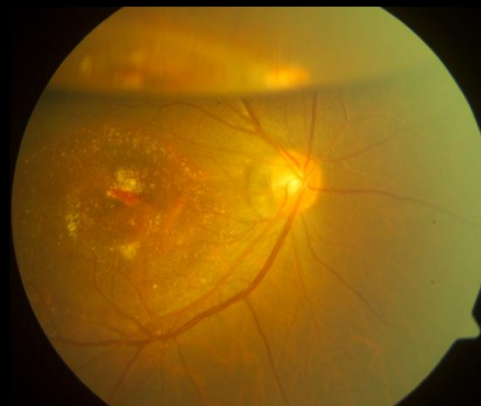
- ❖ To evaluate the **safety and efficacy** of tPA with subsequent pneumatic displacement in the treatment of submacular hemorrhage.
 - ❖ To describe the **demographics**, underlying **etiologies** and **visual outcomes** of patients receiving treatment with tPA in the local population.
 - ❖ To examine the **factors associated** with good or poor treatment outcomes.
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Methods

- A review of **63 consecutive patients** with submacular haemorrhage treated with tPA and pneumatic displacement at Tan Tock Seng Hospital, NHG Eye Institute, Singapore, over a 10-year period (2001-2010).
- Intravitreal injection of 0.05ml tPA (50 μ g/0.1ml), followed by 0.3ml perfluoropropane (C3F8) was performed.
- Patients were instructed to posture down strictly after the procedure.
- Approved by Institutional Review Board / Ethics Committee.



Pre-tPA fundus photo



Post-tPA. (Note gas bubble)

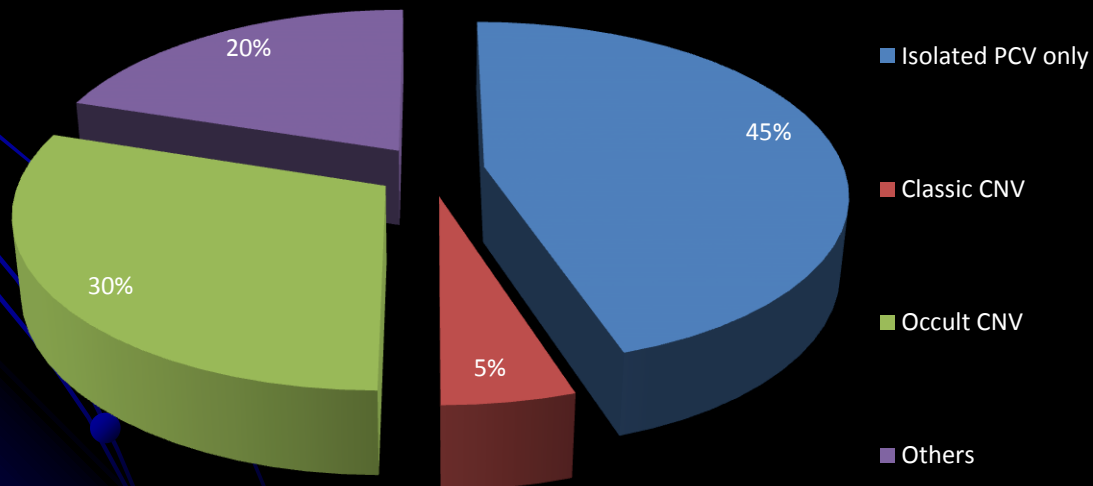


Resolved hemorrhage

Demographics

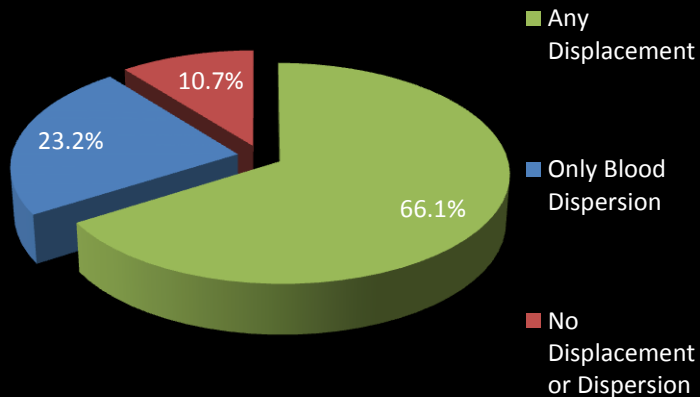
Mean age (years)	63.5 ± 15.1
Race (%)	
<i>Chinese</i>	85.7
<i>Malay</i>	9.5
<i>Others</i>	4.8
Male:Female (%)	55.6 : 44.4
Right Eye: Left Eye (%)	47.6 : 52.4
Median duration of symptoms (days)	5.0
Mean Follow-up period (months)	16.21 ± 1.37
Mean Hemorrhage size (mm ²)	33.95 ± 3.94

Underlying Etiology



Treatment Outcomes

Outcomes of Treatment



- Of the 63 consecutive patients, **89.3%** of them had treatment **successes**.
- **66.1%** of patients achieved clinically evident **blood displacement** and **blood dispersion** was seen in **23.2%**.
- Treatment **failure** occurred in **10.7%** of patients where neither displacement nor dispersion of the blood was seen through the follow-up period.

78.3% had stable or improved VA

Lost lines – 21.7%

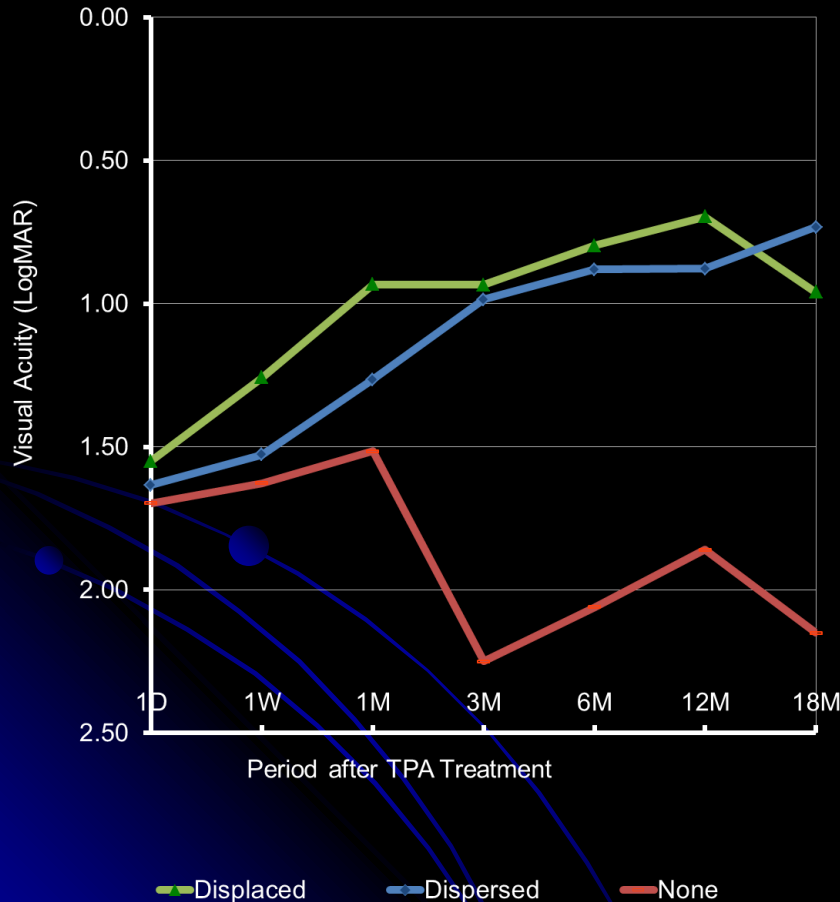
0–1 line gained – 20%

Gained ≥ 2 lines – 58.3%

- **Transient IOP spike** occurred in **30.2%** of patients. All were successfully treated medically and resolved within 24 hrs.
- Five (**7.9%**) patients had **retinal detachment/tears**.
- There were **no cases of endophthalmitis**.

Visual Outcomes

Overall VA Trends Against Time

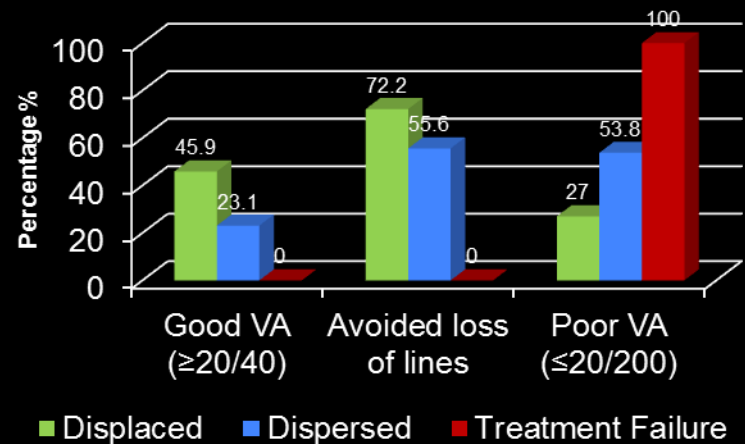


- **Peak mean visual acuity (VA)** was achieved **within 12 months** of treatment.
- Throughout the follow-up period, patients with **treatment success** (hemorrhage displacement or dispersion) had **better visual outcomes** compared to those with treatment failures.
- Those with displaced hemorrhages had the best visual outcomes compared to patients who had only hemorrhage dispersion, and especially those with treatment failure.

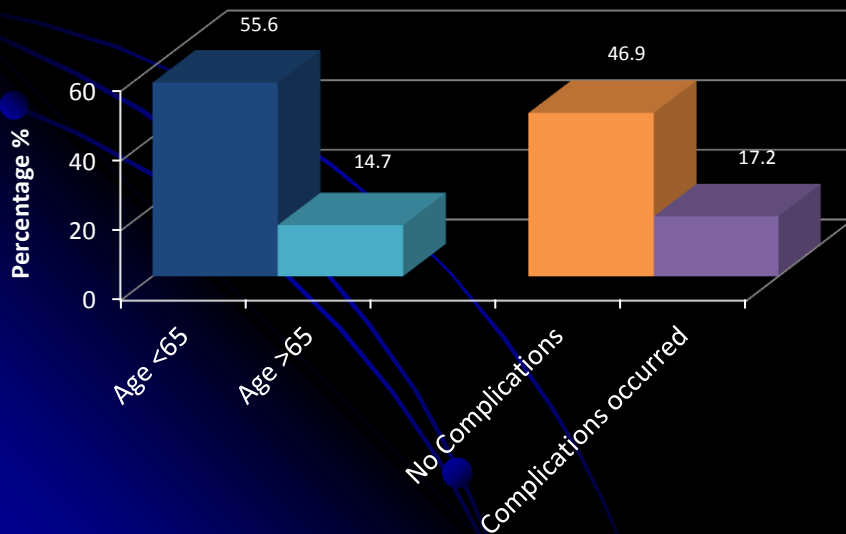
Factors Affecting Visual Outcomes

- Displacement rates were **higher** in those with **PCV (p=0.05)** and **absence of rebleed (p=0.026)**.
- Failure** of displacement was associated with **poor visual outcome (p<0.01)**.

Effect of Treatment Outcomes on VA



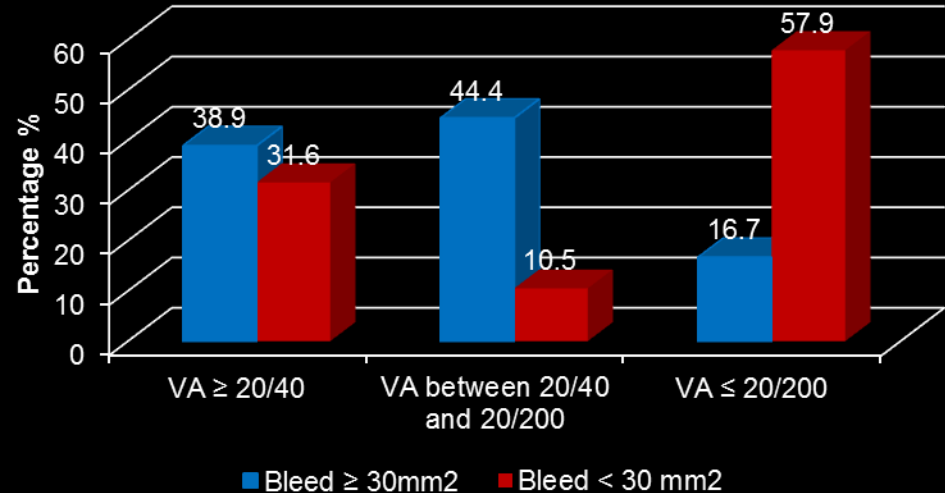
Factors affecting Good Outcome



- Good visual outcomes** were associated with **age ≤ 65 years (p=0.001)** and **absence of procedure-related complications (p=0.016)**.

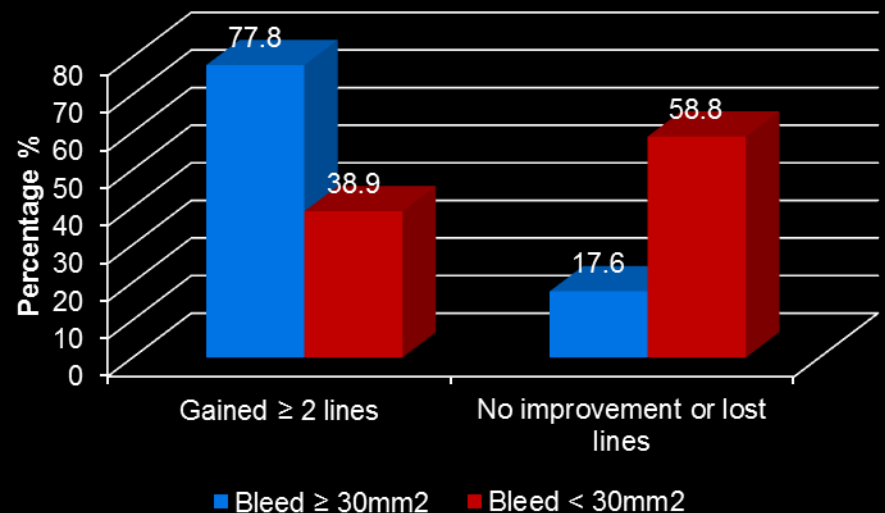
- The **size of haemorrhage correlated** with **gain in lines** (Pearson coefficient 0.445, $p=0.006$) and **better final VA** (Pearson coefficient 0.341, $p<0.05$).

Effect of Hemorrhage Size on Final Visual Acuity



- Patients who had a **bleed of $\geq 30\text{mm}^2$** , had a **better visual outcome** compared to those $<30\text{mm}^2$. ($p=0.01$).

Effect of Hemorrhage Size on Change in Lines of Visual Acuity



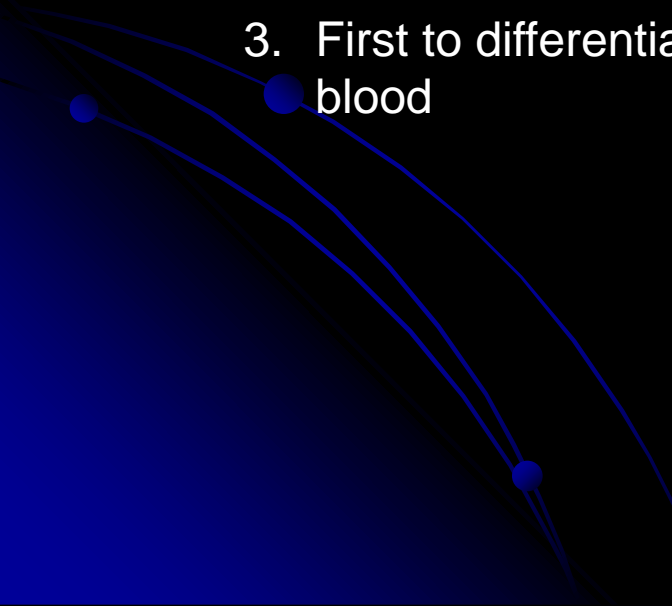
Discussion

- tPA with pneumatic displacement is an **effective and less invasive** way of treating submacular hemorrhages.
- In our series, the use of tPA and pneumatic displacement successfully displaced or reduced submacular hemorrhage in **89.3%** of cases.
- The procedure success rates, **visual outcomes and complication rates are comparable** to previous studies in Western populations. (Table 1).

Table 1: Summary of studies on TPA

Author	No. of Eyes	Successful Displacement	Gain in ≥ 2 lines (%)	Complication rate
Current Study	63	66%	58.3% mean follow-up of 16.2 months	30.2% IOP spike, 22.2% VH, 7.9% RD
Heriot 1997	104	-	64% at 12months	8% VH, 3% RD
Hesse et al. 1999	11	9/11 (82%)	45% mean follow-up of 4.5 months	36% VH with RD, 9% VH, 9% RD
Hassan et al. 1999	15	15/15 (100%)	67% mean follow-up of 10.5 months	20% VH, 7% endophthalmitis
Karlsson et al. 1999	10	6/10 (60%)	-	-
Krepler et al. 2000	11	-	45% at 12 months	-
Hattenbach et al. 2001	43	-	44% mean follow-up of 6 months	8% VH

VH = Vitreous hemorrhage, RD = Retinal detachment

- Visual outcomes is consistently best for those with **displacement of blood, compared to dispersion and especially, non-responders**. This observation has not been previously described.
 - The maximum gain in VA occurs within **12 months**, after which VA gradually declines; most likely, due to the underlying disease process.
 - The strengths of the study are:
 1. **Large** sample size (63 eyes)
 2. Consecutive series over **10 years**
 3. First to differentiate outcomes **according to the displacement** of blood
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Conclusion

- tPA and pneumatic displacement of submacular haemorrhage is **safe and effective**.
- **Good visual improvement can be achieved**, especially in those with successful displacement, younger patients, and those without procedure-related complications.

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