



Analysis of Wave Shaping Automated system V/s the combinational Torsional Longitudinal Phacoemulsification in Brunescant Cataracts

Prof .Keiki R Mehta MD *

Cyres K. Mehta MD

Mehta International Eye Institute
D Y Patil Medical College and Hospital
Breach Candy Hospital
Mumbai India

Purpose of this paper

To compare the new wave shaping technology with the Torsional longitudinal phaco techniques

Disclosure: *Consultant to Zeiss, Allergan, Schwind

MATERIAL AND METHODS

- ✘ Wave shaping technology with the Torsional longitudinal phaco each compared in 200 consecutive cases, 100 each for of cataracts from Grade 3-4 category conducted on single machine by a single surgeon .
- ✘ Comparison using the Zeiss Visalis 500 APM and the Alcon Infiniti Torsional programs
- ✘ The cases were analysed, with reference to The Effective Phaco time ,EPT.
- ✘ Post op outcomes with Central Corneal thickness pre/post, measured with anterior OCT to get a perfect centration. Final BCVA and endothelial cell analysis at 2week level.



WHAT ARE WE REALLY COMPARING

The Alcon Infiniti is the present Gold Standard and what comparing the efficacy, safety and the speed of the procedure in comparison with the Zeiss Visalis APM

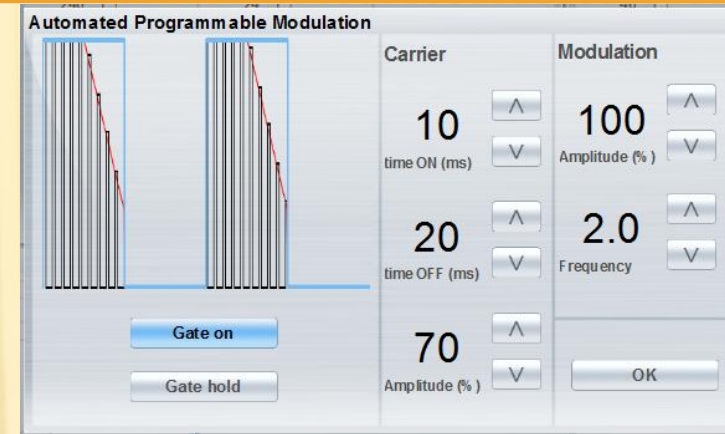
SPECIFICALLY comparing

The phaco mode which will simultaneously allow, while holding the pre selected U/S modulation pattern whether for grooving, holding or chopping or nuclear pieces removal.

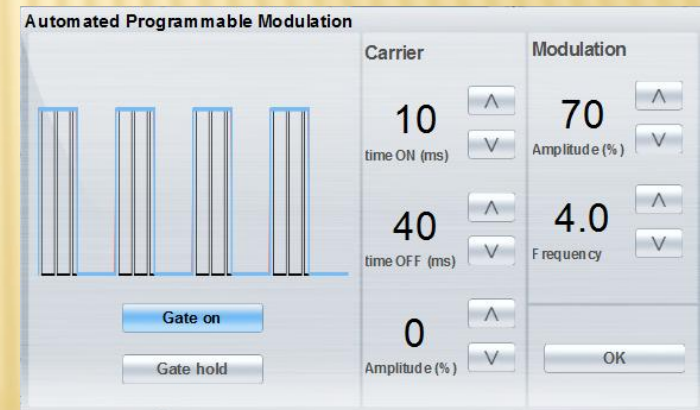
WHAT IS WAVE SHAPING AND HOW DOES IT WORK

The Zeiss Visalis Auto Mated Program modulation system (APM) helps in the delivery of modulated , shaped U/S power without dependence on the ability of the surgeon to control via the footswitch

- ❑ APM , in essence is therefore simply an infinitely variable pulsed U/S mode
- ❑ U/S dissipation is periodically switched “ON” & “OFF” resulting in a Waveform
- ❑ The amplitude of the Waveform is further modified by a triangular wave which consists of falling edges
- ❑ Modulation amplitude moves the triangular wave up or down and
- ❑ Frequency determines the period of the *falling edge*
- ❑ The resulting waveform can be further modified with a Gate by disabling U/S power during selected periods.

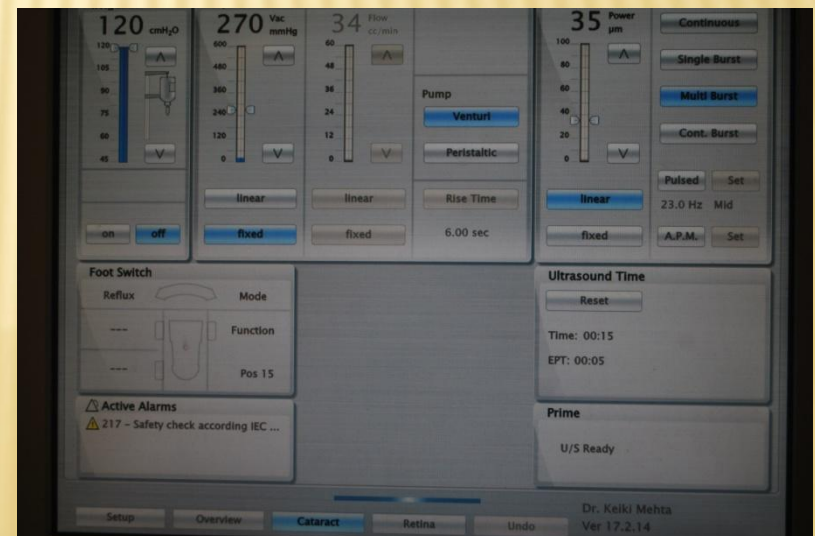
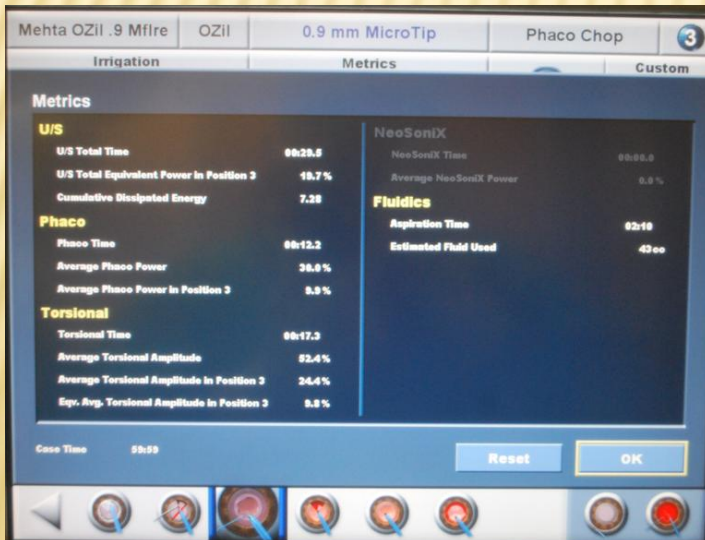
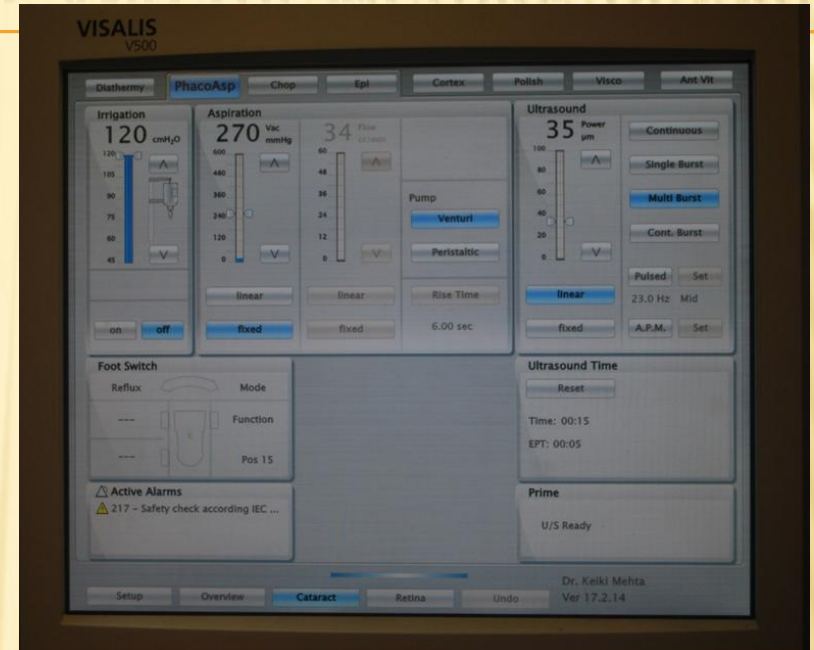


In impaling and chopping hard cataract

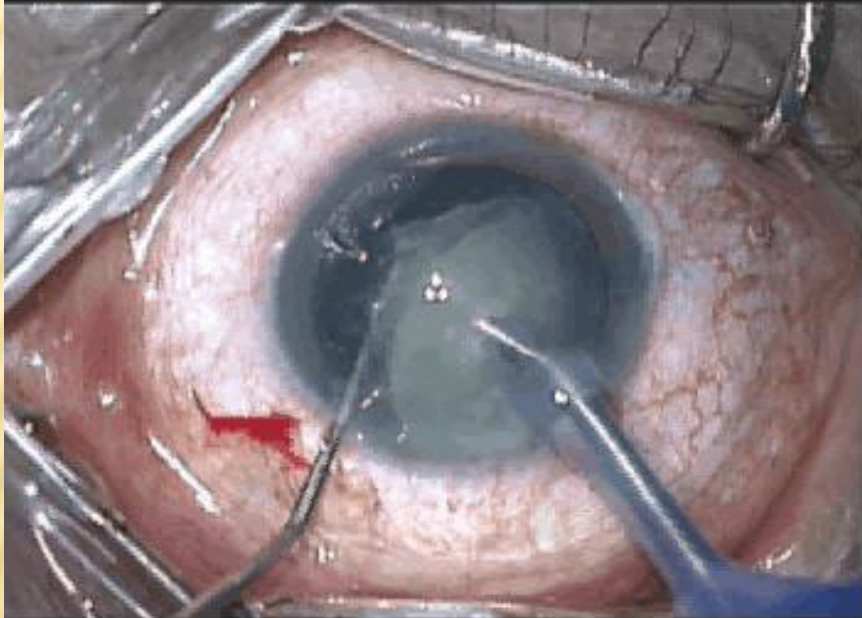


In quadrant chopping

SCREEN SHOTS OF INSTRUMENTS AND THE METRICS OF EACH



WAVE SHAPED V/S TORSIONAL LONGITUDINAL PHACO



Wave Shaping



**Torsional Longitudinal
Phaco**

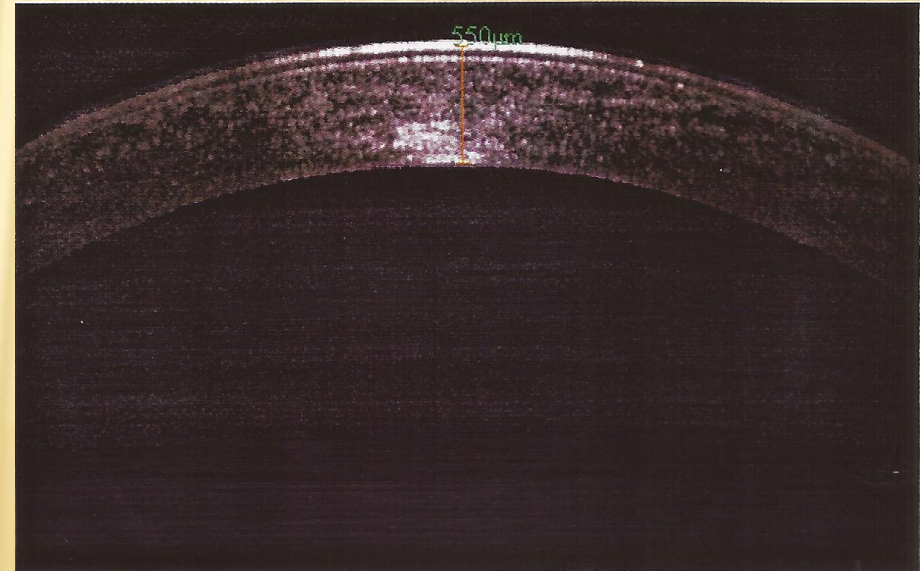
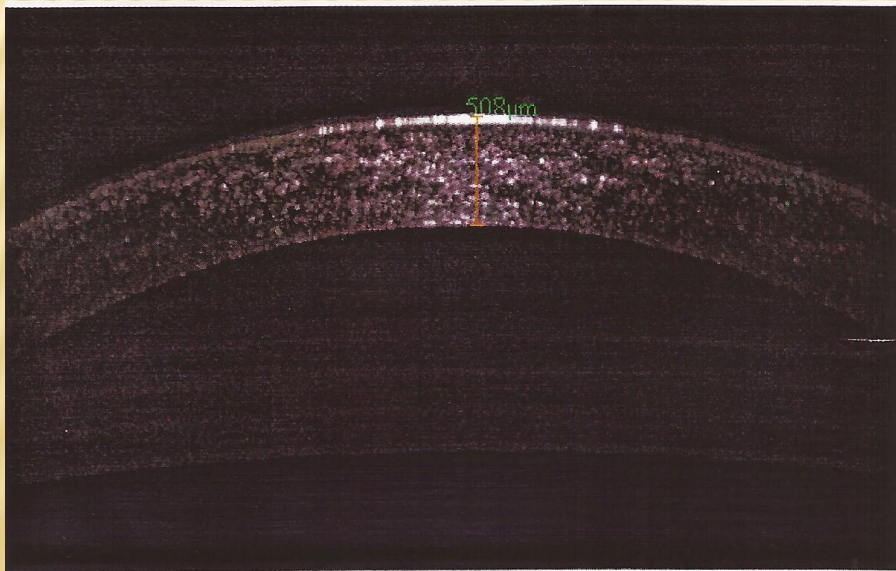
RESULTS N = 200 (100 for each type)

✘ Average Total Phaco Time in seconds							
		No	Torsional		No	Wave Shaping	
✘	Med Cataract	64	24.6		76	21.2	
✘	Hard brown Cat	36	38.7		24	28.5	
✘ Visual Acuity		5 th day::			4 weeks		
		Tor/long		Wave	Tor/long		Wave
✘	6/6-6/9	51		78	89		92
✘	6/9-6/12	42		22	11		08
✘	6/12-6/18	07					

CHANGES IN CORNEAL THICKNESS (IN MICRONS).

- ✘ Evaluated with anterior OCT to be sure that the exact central area of the cornea is obtained evaluated 2 weeks following surgery. Variance from pre and post op in microns.

	Grade 3	Grade 4
Wave shaping	46u +/- 36	67u +/- 45
Torsional / Long	55u +/- 28	65u +/- 38

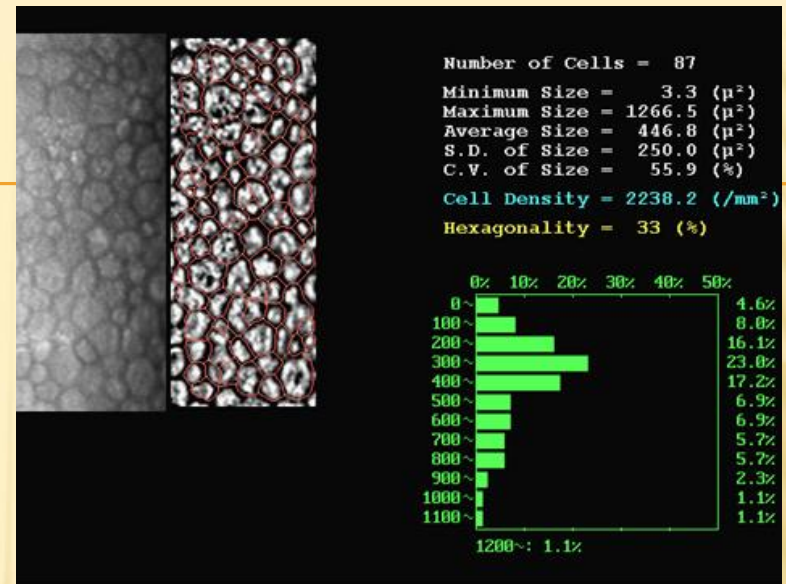


ENDOTHELIAL CELL ANALYSIS

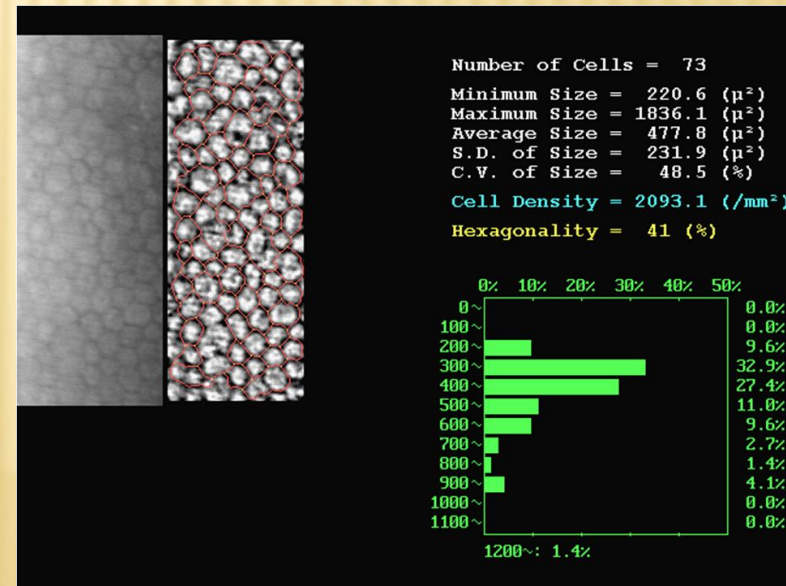
- ✘ Analysis of the Endothelial Cells with the APM has been carried out in detail in the last four months with the Topcon Non Contact Specular Microscope SP-2000P

Average cell loss in Phako

- ✘ Initial data would seem to confirm what we had originally conceived. The cell protection ability of the Wave Shaping seems very good
- ✘ Torsional done by the same surgeon (KRM) utilizing virtually identical parameters and cataract density do show a higher cell loss with torsional
- + Note: The accuracy of the Topcon Non Contact Endothelial Camera technique has a maximum accuracy of (+/-) 2 - 3 % .



Pre Op



Post Op

ENDOTHELIAL CELL DIFFERENCE IN "MEDIUM" DENSITY CATARACTS WITH THE APM SYSTEM

<u>Patient</u>	<u>Pre-Op</u>	<u>Post Op</u>	<u>Difference</u>	<u>%Variation</u>
1 HB	3880	3768	112	2.88 %
2 CG	2464	2386	78	3.16 %
3 MB	2658	2600	58	2.18 %
4 DR	3668	3633	35	0.95 %
5 AS	3348	3264	84	2.50 %
6 HM	4014	3872	142	3.53 %
7 RT	4340	4450	10	0.23 %
8 CD	3964	3856	108	2.72 %
9 SM	2884	2800	84	2.9 %
10DC	4432	4318	114	2.57%

Endothelial Cell loss as evaluated by a Topcon Non -Contact Endothelial camera : **Average Variation = 2.36 %**

ENDOTHELIAL CELL DIFFERENCE IN “MEDIUM” DENSITY CATARACTS WITH THE TORSIONAL SYSTEM

<u>Patient</u>	<u>Pre-Op</u>	<u>Post Op</u>	<u>Difference</u>	<u>%Variation</u>
1 SH	2864	2720	144	5.03%
2 DK	2874	2722	154	5.35 %
3 NR	4148	3960	188	4.53 %
4 TD	3864	3736	128	3.32 %
5 FT	4006	3842	164	4.09 %
6 RK	2884	2798	86	2.98 %
7 FN	3286	3158	128	3.89 %
8 TC	4428	4236	192	4.33 %

Endothelial Cell loss as evaluated by a Topcon Non -Contact

Endothelial camera : **Average Variation = 4.19%**

RESULTS

- ✘ Wave shaping and torsional Longitudinal seem to have very similar metrics with only a few second being faster in the wavefront group.
- ✘ EPT and endothelial cell loss rates less in the Wave shaping group.
- ✘ BCVA on 5th day show better results with the Wave shaping group, however over 4 weeks fairly identical.

CONCLUSION

- ✘ Wave Shaping seems to be a safer technique requiring less energy leaving less endothelial changes.
- ✘ However, over time, both results seems fairly identical.

