Early Ocular Biomechanical Changes after femtosecond-assisted laser refractive cataract surgery

Bruno Valbon, MD; Milton R. Alves, MD,PhD; Bruno Fontes, MD,PhD; Cynthia Roberts, PhD; Luca Gualdi, MD; Renato Ambrósio Jr, MD, PhD.

Universidade de São Paulo
Brasil

Rio de Janeiro
Corneal Tomography and
Biomechanics Study Group

Dr. Ambrósio is a consultant for Oculus / Cynhtia Roberts, PhD is a consultant for Oculus

Purpose:

- To describe ocular biomechanical changes in the early post-operative period of patients who underwent femtosecond laser (FL)-assisted cataract surgery and to evaluate the influence of delta intraocular pressure (IOP) measurements and delta central corneal thickness (CCT) on corneal deformation response.

Methods:

- Retrospective study.
- 76 eyes of 62 consecutive patients who had FL-assisted cataract surgery.
- Dynamic ultra-high speed Scheimpflug imaging and Pentacam (Corvis ST *; Oculus, Wetzlar, Germany) were performed prior to surgery and at 1 day postoperatively.
- The differences of the preoperative and first postoperative day on IOP, CCT and on corneal deformation parameters were assessed using Student T Test or Wilcoxon signed-rank accordingly to the type of distribution (Kolmogorov Smirnov).
- The percentual change of IOP (delta IOP) and CCT (delta CCT) were correlated to all parameters from Corvis ST.

* The Corvis ST (Scheimpflug Technology), a new non-contact tonometry (NCT) system integrated with an ultra-high-speed (UHS) Scheimpflug camera, was recently introduced by Oculus (Wetzlar, Germany) and provides ocular biomechanical and intraocular pressure information.

Results:

- **Comparision between PRE and D1**

*** (all parameters from Corvis ST)**

- **Wilcoxon test**

(Kolmogorov- Smirnov ≤ 0.05)

IOP [mmHg]	≤ 0.0001
Pachy [µm]	≤ 0.0001
Def. Amp. Max [mm]	≤ 0.0001
A1 Time [ms]	≤ 0.0001
A1 Length [mm]	≤ 0.0034
A1 Velocity [m/s]	≤ 0.0003
A2 Time [ms]	≤ 0.0001
A2 Length [mm]	0,1248
A2 Velocity [m/s]	≤ 0.0001
HC Time [ms]	0,0558
Peak Dist. [mm]	0,0257
Radius [mm]	≤ 0.0001
Radius (3P) [mm]	≤ 0.0001
A1 Deformation Amp. [mm]	≤ 0.0001
HC Deformation Amp. [mm]	≤ 0.0001
A2 Deformation Amp. [mm]	0,0008
A1 Deflection Length [mm]	≤ 0.0001
HC Deflection Length [mm]	0,0095
A2 Deflection Length [mm]	≤ 0.0001
HC Deflection Amp. [mm]	≤ 0.0001
A1 Deflection Amp. [mm]	≤ 0.0001
A2 Deflection Amp. [mm]	≤ 0.0001
Deflection Amp. Max [mm]	≤ 0.0001
Deflection Amp. Max [ms]	0,4928
Whole Eye Movement Max [mm]	0,0275
Whole Eye Movement Max [ms]	0,0113
NTSim A1 Time [ms]	≤ 0.0001
NTSim A2 Time [ms]	≤ 0.0001

25 of 28 parameters were statistically significant differences ($p \leq 0.05$)

Only 3 parameters that were not statistically significant differences ($p \leq 0.05$) as A2 Length [mm], HC Time [ms] and Deflection Amp. Max [ms]

Results: Δ parameters from Corvis ST x Δ IOP Corvis ST.

(Δ means : D1 – PRE)_ example :
PRE_Def. Amplitude 1.8 mm; D1_Def. Amplitude 1.4;
1.4 (D1) - 1.8 (PRE) = Δ = -0.4 mm

*** Δ = D1 - PRE**

- Spearman correlation test
- In red, the parameters that were statistically significant.

Corvis ST	IOP Corvis	Value p	rho
Def. Amp. Max [mm]		≤ 0.0001	0,99
A1 Time [ms]		0,45	0,08
A1 Length [mm]		≤ 0.0004	-0,39
A1 Velocity [m/s]		≤ 0.0001	-0,78
A2 Time [ms]		0,58	-0,06
A2 Length [mm]		≤ 0.0001	0,52
A2 Velocity [m/s]		0,94	0,008
HC Time [ms]		≤ 0.0001	-0,5
Peak Dist. [mm]		≤ 0.0001	0,52
Radius [mm]		≤ 0.0001	0,43
Radius (3P) [mm]		≤ 0.0001	0,53
A1 Deformation Amp. [mm]		≤ 0.0001	-0,82
HC Deformation Amp. [mm]		0,34	-0,11
A2 Deformation Amp. [mm]		≤ 0.0153	0,27
A1 Deflection Length [mm]		≤ 0.0001	-0,83

Corvis ST	IOP Corvis	Value p	rho
HC Deflection Length [mm]		0,8	-0,02
A2 Deflection Length [mm]		≤ 0.0001	-0,88
HC Deflection Amp. [mm]		0,3	0,11
A1 Deflection Amp. [mm]		0,93	0,009
A2 Deflection Amp. [mm]		≤ 0.0001	-0,89
Deflection Amp. Max [mm]		0,96	-0,0057
Deflection Amp. Max [ms]		0,57	0,06
Whole Eye Movement Max [mm]		0,65	0,05
Whole Eye Movement Max [ms]		≤ 0.0001	0,73
NTSim A1 Time [ms]		≤ 0.0001	-0,66
NTSim A2 Time [ms]		0,91	0,01

Results: Δ parameters from Corvis ST x Δ Pachy apex (Pentacam HR).

(Δ means : D1 – PRE)_ example :
PRE_Def. Amplitude 1.8 mm; D1_Def. Amplitude 1.4;
1.4 (D1) - 1.8 (PRE) = Δ = -0.4 mm

*** Δ = D1 - PRE**

- Spearman correlation test
- In red, the parameters that were statistically significant.

Corvis	PACHY APEX (Pentacam HR)	Value p	rho
Def. Amp. Max [mm]		0,2	0,14
A1 Time [ms]		0,97	0,003
A1 Length [mm]		0,2	-0,14
A1 Velocity [m/s]		0,98	-0,0022
A2 Time [ms]		0,82	0,02
A2 Length [mm]		0,6	0,06
A2 Velocity [m/s]		0,24	-0,13
HC Time [ms]		0,39	0,09
Peak Dist. [mm]		0,7	0,04
Radius [mm]		≤ 0.0006	0,38
Radius (3P) [mm]		≤ 0.0011	0,36
A1 Deformation Amp. [mm]		0,28	0,12
HC Deformation Amp. [mm]		0,2	0,14
A2 Deformation Amp. [mm]		0,09	0,19
A1 Deflection Length [mm]		≤ 0.0001	0,56

Corvis	PACHY APEX (Pentacam HR)	Value p	rho
HC Deflection Length [mm]		≤ 0.026	0,25
A2 Deflection Length [mm]		≤ 0.0014	0,36
HC Deflection Amp. [mm]		0,29	0,12
A1 Deflection Amp. [mm]		0,43	0,09
A2 Deflection Amp. [mm]		0,27	0,12
Deflection Amp. Max [mm]		0,31	0,11
Deflection Amp. Max [ms]		0,16	0,16
Whole Eye Movement Max [mm]		0,29	0,12
Whole Eye Movement Max [ms]		0,42	-0,09
NTSim A1 Time [ms]		0,95	-0,006
NTSim A2 Time [ms]		0,9	-0,01

DIFFERENCES BETWEEN THE CORRELATIONS OF ALL Δ PARAMETERS FROM CORVIS ST X IOP / PACHY APEX

Δ parameters from Corvis ST x Δ IOP Corvis ST.

Corvis ST	IOP Corvis	Value p	rho
Def. Amp. Max [mm]		≤ 0.0001	0,99
A1 Time [ms]		0,45	0,08
A1 Length [mm]		≤ 0.0004	-0,39
A1 Velocity [m/s]		≤ 0.0001	-0,78
A2 Time [ms]		0,58	-0,06
A2 Length [mm]		≤ 0.0001	0,52
A2 Velocity [m/s]		0,94	0,008
HC Time [ms]		≤ 0.0001	-0,5
Peak Dist. [mm]		≤ 0.0001	0,52
Radius [mm]		≤ 0.0001	0,43
Radius (3P) [mm]		≤ 0.0001	0,53
A1 Deformation Amp. [mm]		≤ 0.0001	-0,82
HC Deformation Amp. [mm]		0,34	-0,11
A2 Deformation Amp. [mm]		≤ 0.0153	0,27
A1 Deflection Length [mm]		≤ 0.0001	-0,83

Δ parameters from Corvis ST x Δ Pachy apex (Pentcam HR).

Corvis	PACHY APEX (Pentacam HR)	Value p	rho
Def. Amp. Max [mm]		0,2	0,14
A1 Time [ms]		0,97	0,003
A1 Length [mm]		0,2	-0,14
A1 Velocity [m/s]		0,98	-0,0022
A2 Time [ms]		0,82	0,02
A2 Length [mm]		0,6	0,06
A2 Velocity [m/s]		0,24	-0,13
HC Time [ms]		0,39	0,09
Peak Dist. [mm]		0,7	0,04
Radius [mm]		≤ 0.0006	0,38
Radius (3P) [mm]		≤ 0.0011	0,36
A1 Deformation Amp. [mm]		0,28	0,12
HC Deformation Amp. [mm]		0,2	0,14
A2 Deformation Amp. [mm]		0,09	0,19
A1 Deflection Length [mm]		≤ 0.0001	0,56

Δ parameters from Corvis ST x Δ IOP Corvis ST.

Corvis ST	IOP Corvis	Value p	rho
HC Deflection Length [mm]		0,8	-0,02
A2 Deflection Length [mm]		≤ 0.0001	-0,88
HC Deflection Amp. [mm]		0,3	0,11
A1 Deflection Amp. [mm]		0,93	0,009
A2 Deflection Amp. [mm]		≤ 0.0001	-0,89
Deflection Amp. Max [mm]		0,96	-0,0057
Deflection Amp. Max [ms]		0,57	0,06
Whole Eye Movement Max [mm]		0,65	0,05
Whole Eye Movement Max [ms]		≤ 0.0001	0,73
NTSim A1 Time [ms]		≤ 0.0001	-0,66
NTSim A2 Time [ms]		0,91	0,01

Δ parameters from Corvis ST x Δ Pachy apex (Pentcam HR).

Corvis	PACHY APEX (Pentacam HR)	Value p	rho
HC Deflection Length [mm]		≤ 0.026	0,25
A2 Deflection Length [mm]		≤ 0.0014	0,36
HC Deflection Amp. [mm]		0,29	0,12
A1 Deflection Amp. [mm]		0,43	0,09
A2 Deflection Amp. [mm]		0,27	0,12
Deflection Amp. Max [mm]		0,31	0,11
Deflection Amp. Max [ms]		0,16	0,16
Whole Eye Movement Max [mm]		0,29	0,12
Whole Eye Movement Max [ms]		0,42	-0,09
NTSim A1 Time [ms]		0,95	-0,006
NTSim A2 Time [ms]		0,9	-0,01

We separate two groups to evaluate the variation of IOP with parameters from deformation cornea (CORVIS ST):

Variation of IOP ≥ 5 mmHg and -1mmHg;+1mmHg _ D1 x PRE

group 1 : LENSEX _ 28 EYES (variation of IOP ≥ 5 mmHg between D1 and PRE)

group 2 : LENSEX_21 EYES IOP (variation of IOP -1mmHg;+1mmHg between D1 and PRE)

Comparision test (T-TEST) : groups 1 and 2 (between PRE x D1)

LENSEX 28 EYES
(Group 1 IOP ≥ 5 mmHg) PRE X D1

IOP [mmHg]	0,0001
Pachy [µm]	0,0001
Def. Amp. Max [mm]	0,0001
A1 Time [ms]	0,0001
A1 Length [mm]	0,0061
A1 Velocity [m/s]	0,0001
A2 Time [ms]	0,0001
A2 Length [mm]	0,7616
A2 Velocity [m/s]	0,0001
HC Time [ms]	0,023
Peak Dist. [mm]	0,0024
Radius [mm]	0,0001
Radius (3P) [mm]	0,0001
A1 Deformation Amp. [mm]	0,0001
HC Deformation Amp. [mm]	0,0001
A2 Deformation Amp. [mm]	0,4227
A1 Deflection Length [mm]	0,0001
HC Deflection Length [mm]	0,0001
A2 Deflection Length [mm]	0,0001
HC Deflection Amp. [mm]	0,0001
A1 Deflection Amp. [mm]	0,0001
A2 Deflection Amp. [mm]	0,1466
Deflection Amp. Max [mm]	0,0001
Deflection Amp. Max [ms]	0,34
Whole Eye Movement Max [mm]	0,4783
Whole Eye Movement Max [ms]	0,1932
NTSim A1 Time [ms]	0,0001
NTSim A2 Time [ms]	0,0001
Pachy apex TOMO	0,0001

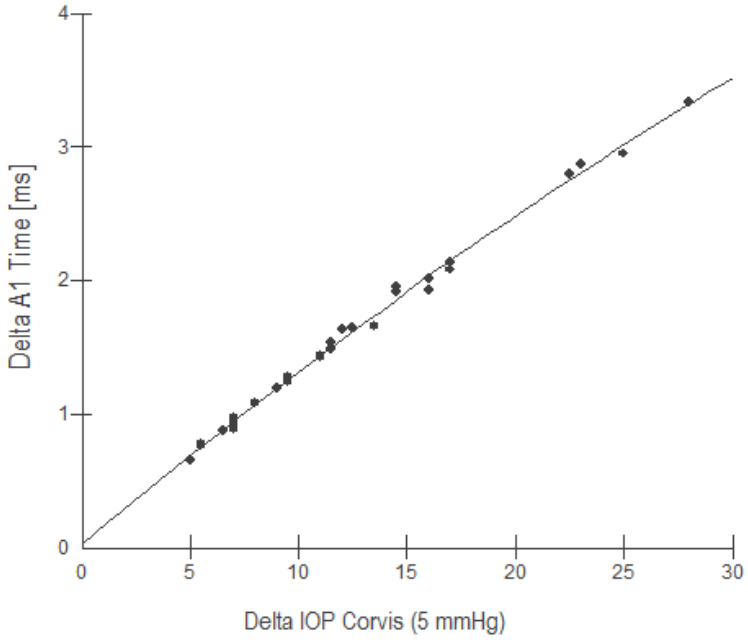
LENSEX 21 EYES
Group 2 IOP (±1) PRE X D1

IOP [mmHg]	0.8667
Pachy [µm]	0.0001
Def. Amp. Max [mm]	0.3371
A1 Time [ms]	0.9442
A1 Length [mm]	0.3162
A1 Velocity [m/s]	0.3378
A2 Time [ms]	0.0025
A2 Length [mm]	0.0246
A2 Velocity [m/s]	0.0498
HC Time [ms]	0.4105
Peak Dist. [mm]	0.6399
Radius [mm]	0.0866
Radius (3P) [mm]	0.0362
A1 Deformation Amp. [mm]	0.0030
HC Deformation Amp. [mm]	0.3371
A2 Deformation Amp. [mm]	0.0128
A1 Deflection Length [mm]	0.0001
HC Deflection Length [mm]	0.0410
A2 Deflection Length [mm]	0.0001
HC Deflection Amp. [mm]	0.8110
A1 Deflection Amp. [mm]	0.0001
A2 Deflection Amp. [mm]	0.0001
Deflection Amp. Max [mm]	0.5983
Deflection Amp. Max [ms]	0.3188
Whole Eye Movement Max [mm]	0.4176
Whole Eye Movement Max [ms]	0.8750
NTSim A1 Time [ms]	0.6057
NTSim A2 Time [ms]	0.1054
Pachy apex TOMO	0.0001

Δ IOP Corvis (variation of ≥ 5 mmHg) x Δ parameters from Corvis ST

Pearson test _ Correlations

✓ 9 of 27 parameters were statistically significant

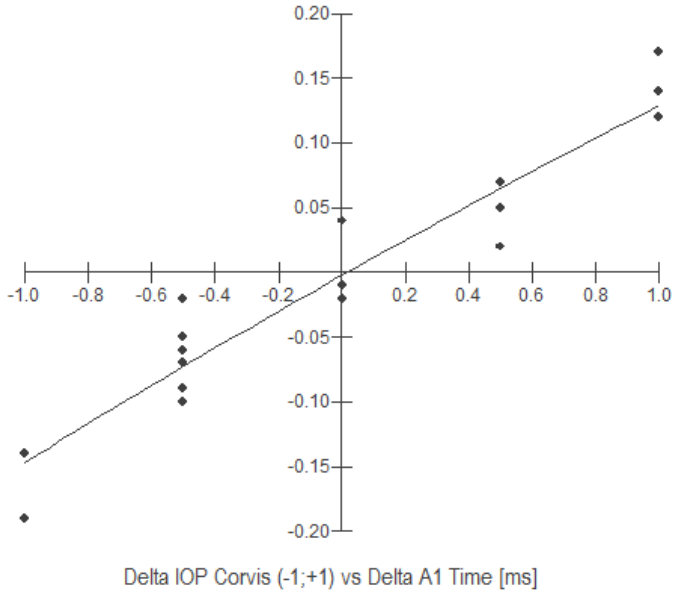


Graphic A1 Time (ms) with coeff. (rp) 0.99

Delta IOP ≥ 5 mmHg vs Delta parameters from Corvis			
Pearson	rp	Pearson	rp
IOP ≥ 5 mmHg vs	Def. Amp. Max [mm]	0,0001	-0,6776
IOP ≥ 5 mmHg vs	A1 Time [ms]	0,0001	0,9972
IOP ≥ 5 mmHg vs	A1 Length [mm]	0,9159	0,0209
IOP ≥ 5 mmHg vs	A1 Velocity [m/s]	0,6871	0,0796
IOP ≥ 5 mmHg vs	A2 Time [ms]	0,0001	-0,7896
IOP ≥ 5 mmHg vs	A2 Length [mm]	0,5637	-0,114
IOP ≥ 5 mmHg vs	A2 Velocity [m/s]	0,1129	0,3063
IOP ≥ 5 mmHg vs	HC Time [ms]	0,0265	0,4187
IOP ≥ 5 mmHg vs	Peak Dist. [mm]	0,0224	-0,4298
IOP ≥ 5 mmHg vs	Radius [mm]	0,1372	0,288
IOP ≥ 5 mmHg vs	Radius (3P) [mm]	0,3212	0,1945
IOP ≥ 5 mmHg vs	A1 Deformation Amp. [mm]	0,204	0,2475
IOP ≥ 5 mmHg vs	HC Deformation Amp. [mm]	0,0001	-0,6776
IOP ≥ 5 mmHg vs	A2 Deformation Amp. [mm]	0,5566	-0,116
IOP ≥ 5 mmHg vs	A1 Deflection Length [mm]	0,7189	0,0712
IOP ≥ 5 mmHg vs	HC Deflection Length [mm]	0,0001	-0,8716
IOP ≥ 5 mmHg vs	A2 Deflection Length [mm]	0,8319	-0,042
IOP ≥ 5 mmHg vs	HC Deflection Amp. [mm]	0,0001	-0,851
IOP ≥ 5 mmHg vs	A1 Deflection Amp. [mm]	0,8002	-0,0501
IOP ≥ 5 mmHg vs	A2 Deflection Amp. [mm]	0,3717	-0,1904
IOP ≥ 5 mmHg vs	Deflection Amp. Max [mm]	0,0001	-0,8812
IOP ≥ 5 mmHg vs	Deflection Amp. Max [ms]	0,1198	0,3008
IOP ≥ 5 mmHg vs	Whole Eye Movement Max [mm]	0,1246	0,2971
IOP ≥ 5 mmHg vs	Whole Eye Movement Max [ms]	0,7023	0,0756
IOP ≥ 5 mmHg vs	NTSim A1 Time [ms]	0,1036	0,314
IOP ≥ 5 mmHg vs	NTSim A2 Time [ms]	0,0613	-0,358
IOP ≥ 5 mmHg vs	Pachy apex TOMO	0,962	0,0094

Δ IOP Corvis (variation of ± 1 mmHg) x Δ parameters from Corvis ST

✓ Only the A1 Time [ms] was statistically significant with rp(coeff.) of 0.95



Pearson test _ Correlations

Delta IOP (-1;+1) vs Delta parameters from Corvis		Pearson	rp
IOP [mmHg] (-1;+1)	Def. Amp. Max [mm]	0.7945	-0.06
IOP [mmHg] (-1;+1)	A1 Time [ms]	0.0001	0.95
IOP [mmHg] (-1;+1)	A1 Length [mm]	0.5442	0.14
IOP [mmHg] (-1;+1)	A1 Velocity [m/s]	0.2998	0.23
IOP [mmHg] (-1;+1)	A2 Time [ms]	0.073	-0.39
IOP [mmHg] (-1;+1)	A2 Length [mm]	0.0953	-0.37
IOP [mmHg] (-1;+1)	A2 Velocity [m/s]	0.5918	-0.12
IOP [mmHg] (-1;+1)	HC Time [ms]	0.7482	0.07
IOP [mmHg] (-1;+1)	Peak Dist. [mm]	0.7233	0.08
IOP [mmHg] (-1;+1)	Radius [mm]	0.1741	0.30
IOP [mmHg] (-1;+1)	Radius (3P) [mm]	0.2532	0.26
IOP [mmHg] (-1;+1)	A1 Deformation Amp. [mm]	0.1502	0.32
IOP [mmHg] (-1;+1)	HC Deformation Amp. [mm]	0.7945	-0.06
IOP [mmHg] (-1;+1)	A2 Deformation Amp. [mm]	0.5986	-0.12
IOP [mmHg] (-1;+1)	A1 Deflection Length [mm]	0.4783	0.16
IOP [mmHg] (-1;+1)	HC Deflection Length [mm]	0.3057	0.23
IOP [mmHg] (-1;+1)	A2 Deflection Length [mm]	0.9351	0.01
IOP [mmHg] (-1;+1)	HC Deflection Amp. [mm]	0.9435	0.01
IOP [mmHg] (-1;+1)	A1 Deflection Amp. [mm]	0.9313	-0.02
IOP [mmHg] (-1;+1)	A2 Deflection Amp. [mm]	0.1825	-0.3
IOP [mmHg] (-1;+1)	Deflection Amp. Max [mm]	0.9499	0.01
IOP [mmHg] (-1;+1)	Deflection Amp. Max [ms]	0.4967	0.15
IOP [mmHg] (-1;+1)	Whole Eye Movement Max [mm]	0.6439	0.10
IOP [mmHg] (-1;+1)	Whole Eye Movement Max [ms]	0.5264	0.1465
IOP [mmHg] (-1;+1)	NTSim A1 Time [ms]	0.7204	-0.08
IOP [mmHg] (-1;+1)	NTSim A2 Time [ms]	0.7957	-0.07
IOP [mmHg] (-1;+1)	Pachy apex TOMO	0.9842	0.004

Δ IOP Corvis (variation of ≥ 5 mmHg) x Δ parameters from Corvis ST

Delta IOP ≥ 5 mmHg vs Delta parameters from Corvis			
		Pearson	rp
IOP ≥ 5 mmHg vs	Def. Amp. Max [mm]	0,0001	-0,6776
IOP ≥ 5 mmHg vs	A1 Time [ms]	0,0001	0,9972
IOP ≥ 5 mmHg vs	A1 Length [mm]	0,9159	0,0209
IOP ≥ 5 mmHg vs	A1 Velocity [m/s]	0,6871	0,0796
IOP ≥ 5 mmHg vs	A2 Time [ms]	0,0001	-0,7896
IOP ≥ 5 mmHg vs	A2 Length [mm]	0,5637	-0,114
IOP ≥ 5 mmHg vs	A2 Velocity [m/s]	0,1129	0,3063
IOP ≥ 5 mmHg vs	HC Time [ms]	0,0265	0,4187
IOP ≥ 5 mmHg vs	Peak Dist. [mm]	0,0224	-0,4298
IOP ≥ 5 mmHg vs	Radius [mm]	0,1372	0,288
IOP ≥ 5 mmHg vs	Radius (3P) [mm]	0,3212	0,1945
IOP ≥ 5 mmHg vs	A1 Deformation Amp. [mm]	0,204	0,2475
IOP ≥ 5 mmHg vs	HC Deformation Amp. [mm]	0,0001	-0,6776
IOP ≥ 5 mmHg vs	A2 Deformation Amp. [mm]	0,5566	-0,116
IOP ≥ 5 mmHg vs	A1 Deflection Length [mm]	0,7189	0,0712
IOP ≥ 5 mmHg vs	HC Deflection Length [mm]	0,0001	-0,8716
IOP ≥ 5 mmHg vs	A2 Deflection Length [mm]	0,8319	-0,042
IOP ≥ 5 mmHg vs	HC Deflection Amp. [mm]	0,0001	-0,851
IOP ≥ 5 mmHg vs	A1 Deflection Amp. [mm]	0,8002	-0,0501
IOP ≥ 5 mmHg vs	A2 Deflection Amp. [mm]	0,3717	-0,1904
IOP ≥ 5 mmHg vs	Deflection Amp. Max [mm]	0,0001	-0,8812
IOP ≥ 5 mmHg vs	Deflection Amp. Max [ms]	0,1198	0,3008
IOP ≥ 5 mmHg vs	Whole Eye Movement Max [mm]	0,1246	0,2971
IOP ≥ 5 mmHg vs	Whole Eye Movement Max [ms]	0,7023	0,0756
IOP ≥ 5 mmHg vs	NTSim A1 Time [ms]	0,1036	0,314
IOP ≥ 5 mmHg vs	NTSim A2 Time [ms]	0,0613	-0,358
IOP ≥ 5 mmHg vs	Pachy apex TOMO	0,962	0,0094

Δ IOP Corvis (variation of ± 1 mmHg) x Δ parameters from Corvis ST

Delta IOP (-1;+1) vs Delta parameters from Corvis			
		Pearson	rp
IOP [mmHg] (-1;+1)	Def. Amp. Max [mm]	0.7945	-0.06
IOP [mmHg] (-1;+1)	A1 Time [ms]	0.0001	0.95
IOP [mmHg] (-1;+1)	A1 Length [mm]	0.5442	0.14
IOP [mmHg] (-1;+1)	A1 Velocity [m/s]	0.2998	0.23
IOP [mmHg] (-1;+1)	A2 Time [ms]	0.073	-0.39
IOP [mmHg] (-1;+1)	A2 Length [mm]	0.0953	-0.37
IOP [mmHg] (-1;+1)	A2 Velocity [m/s]	0.5918	-0.12
IOP [mmHg] (-1;+1)	HC Time [ms]	0.7482	0.07
IOP [mmHg] (-1;+1)	Peak Dist. [mm]	0.7233	0.08
IOP [mmHg] (-1;+1)	Radius [mm]	0.1741	0.30
IOP [mmHg] (-1;+1)	Radius (3P) [mm]	0.2532	0.26
IOP [mmHg] (-1;+1)	A1 Deformation Amp. [mm]	0.1502	0.32
IOP [mmHg] (-1;+1)	HC Deformation Amp. [mm]	0.7945	-0.06
IOP [mmHg] (-1;+1)	A2 Deformation Amp. [mm]	0.5986	-0.12
IOP [mmHg] (-1;+1)	A1 Deflection Length [mm]	0.4783	0.16
IOP [mmHg] (-1;+1)	HC Deflection Length [mm]	0.3057	0.23
IOP [mmHg] (-1;+1)	A2 Deflection Length [mm]	0.9351	0.01
IOP [mmHg] (-1;+1)	HC Deflection Amp. [mm]	0.9435	0.01
IOP [mmHg] (-1;+1)	A1 Deflection Amp. [mm]	0.9313	-0.02
IOP [mmHg] (-1;+1)	A2 Deflection Amp. [mm]	0.1825	-0.3
IOP [mmHg] (-1;+1)	Deflection Amp. Max [mm]	0.9499	0.01
IOP [mmHg] (-1;+1)	Deflection Amp. Max [ms]	0.4967	0.15
IOP [mmHg] (-1;+1)	Whole Eye Movement Max [mm]	0.6439	0.10
IOP [mmHg] (-1;+1)	Whole Eye Movement Max [ms]	0.5264	0.1465
IOP [mmHg] (-1;+1)	NTSim A1 Time [ms]	0.7204	-0.08
IOP [mmHg] (-1;+1)	NTSim A2 Time [ms]	0.7957	-0.07
IOP [mmHg] (-1;+1)	Pachy apex TOMO	0.9842	0.004

Results_resume

- There were statistically significant differences ($p \leq 0.05$) of CCT, IOP and all parameters from Corivis ST, excluding highest concavity (HC) time, second applanation length and maximal deflection amplitude.
- Deformation amplitude (DA) and corneal velocities were lower at 1 day compared to preoperatively ($p \leq .0001$). There was a significant increase of CCT (average 80.52 µ +/- 33.76) and of IOP (average 5.42 mmHg +/- 7.56).
- There were more significant correlations between corneal deformation parameters and delta IOP than with delta CCT.
- Measured IOP was negatively associated with deformation parameters such as maximal deformation and deflection amplitude, preoperatively and 1 day postoperatively ($p \leq .0001$).
- Group 1 (Variation of IOP $\geq$ 5 mmHg) had higher influences on measurements from deformation cornea by Corvis than group 2 (Variation of IOP -1mmHg;+1mmHg).

Conclusions

- There is mild edema and mild ocular hypertension in the first day after FS-assisted cataract surgery.

- The changes of IOP had higher influences with the changes on ocular biomechanics than CCT.

Universidade de São Paulo
Brasil

Rio de Janeiro
Corneal Tomography and
Biomechanics Study Group