RESULTS

This study was conducted on 30 eyes of 18 patients who are high myopes indicated for cataract surgery or clear lens extraction with foldable PC-IOL implantation. The patients were divided into two groups; group (A) and group (B). Group (A) included the patients who underwent implantation of one-piece IOLs where group (B) included the patients who underwent implantation of three-piece IOLs.

Detailed statistical analysis of each of the measured parameters was done with comparing the preoperative values to the postoperative values. Different results are demonstrated in tables and illustrative graphs.

The data was statistically described in terms of range, mean, standard deviation (±SD), frequencies (number of cases) and relative frequencies (percentages) when appropriate. Comparison of quantitative variables between the 2 groups was done using Student t test. Comparison between pre and postoperative data was done using Paired t test for comparing categorical data. Chi square (x^2) test was performed. The association between two variables was done using correlation coefficient (r). A probability value (P value) less than 0.05 was considered statistically significant. P value less than 0.001 was considered statistically highly significant. P value more than 0.05 was considered statistically non- significant. All statistical calculations were done using SPSS version 16 (Statistical Package for the Social Science; SPSS Inc., IL, USA) statistical program.

No statistically significant differences were found between the two groups (A) & (B) regarding the age & sex distribution so they are cross-matched groups i.e. similar and homogenous.

Sex distribution

Sixteen patients were females (53.3%) while fourteen patients were males (46.7%).

Table (3): Percentages of sex distribution in the study groups.

		Group A		Group B	
		No.	%	No.	%
SEX	F	7	46.7%	9	60.0%
	M	8	53.3%	6	40.0%

X^2= 0.1 P>0.05

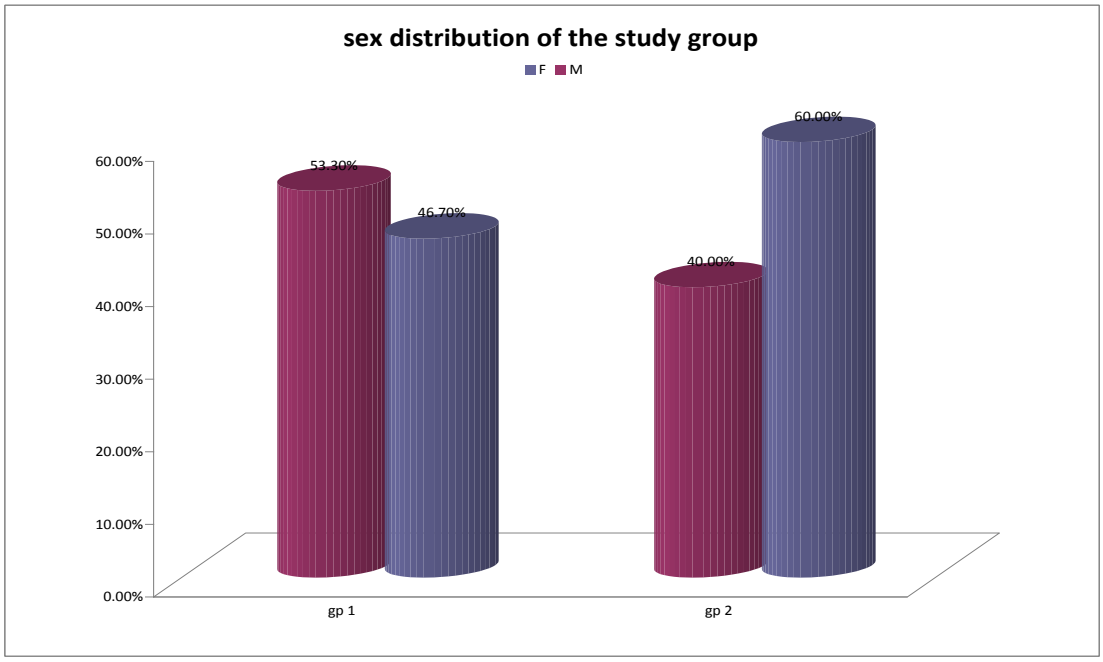


Fig. (36): Sex distribution of the study groups.

Age distribution

The age ranged from 21 to 75 years with a mean of 47.07 years (SD ±22.03) in group (A) and 42.47 years (SD ±15.72) in group (B).

Table (4): Range; mean (± SD) of age among the study groups.

	Group A	Group B
Range	21-75	21-72
Mean	47.07	42.47
±S.D	22.031	15.720
t	0.7	
P	>0.05	

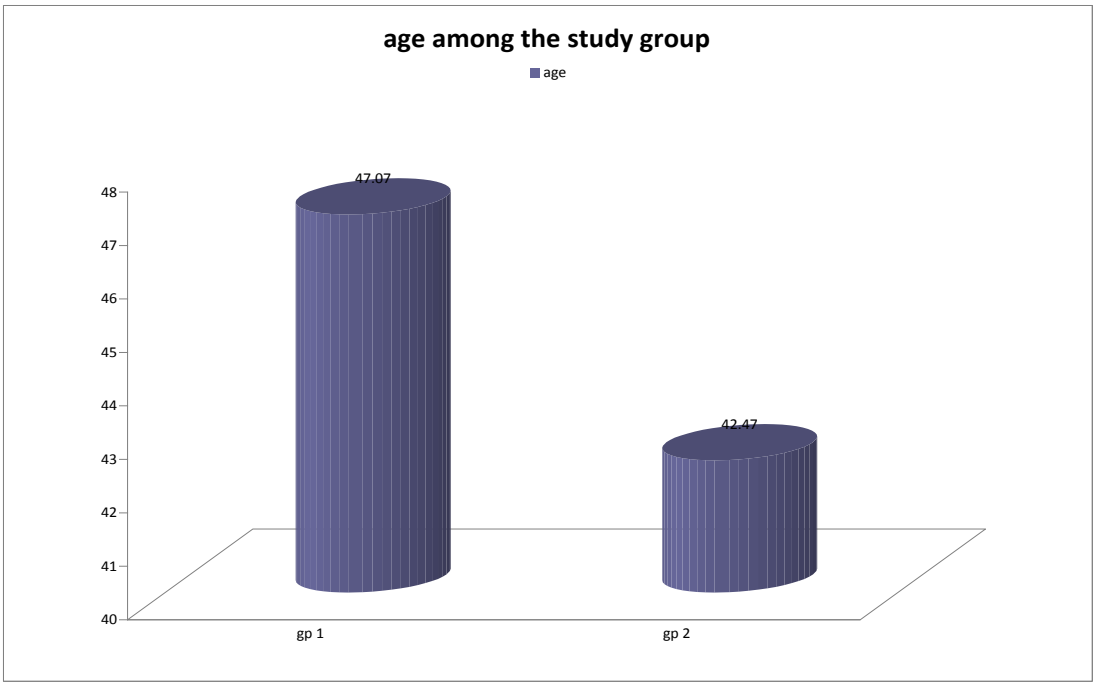


Fig. (37): Age distribution of the study groups.

Anterior segment parameters

There was an increase in the postoperative values of the measured anterior segment parameters, so that the difference between the preoperative values and the measured postoperative values was found to be statistically highly significant (P value < 0.001). Although there were some changes between the postoperative values at one month and three months, these changes were not statistically significant (P value > 0.05).

On comparing between the preoperative and postoperative measured anterior segment parameters; groups (A) and (B) were not statistically different for each variable studied (i.e. ACD, AOD 500 µm, TIA). Therefore, a single group containing all patients from either group was considered when comparing the values of the preoperative and postoperative measurements.

Anterior chamber depth:

The mean increase in ACD was 1.1 mm, approximately 32% deeper than before surgery.

Table (5): Values of ACD (in mm) in the study population throughout follow up with comparing between the preoperative and postoperative values.

ACD	Mean	±S.D	Test of significance		
			Between	Paired t test	P
Pre operative	3.36	0.43	Pre & 1m post	11.9	<0.001
1m post operative	4.48	0.49	Pre & 3m post	14.4	<0.001
3m post operative	4.45	0.44	1m post & 3m post	0.6	>0.05

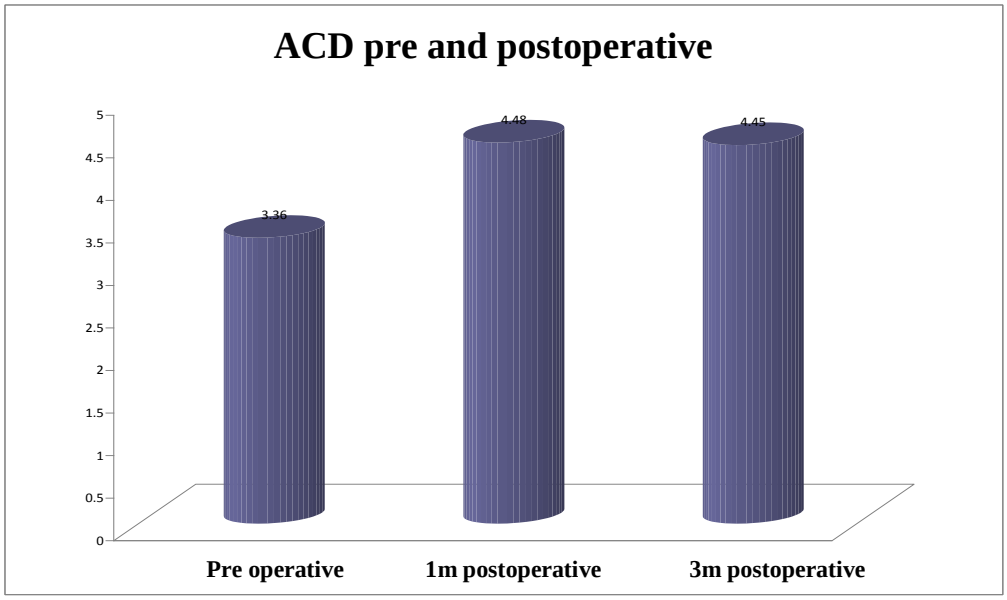
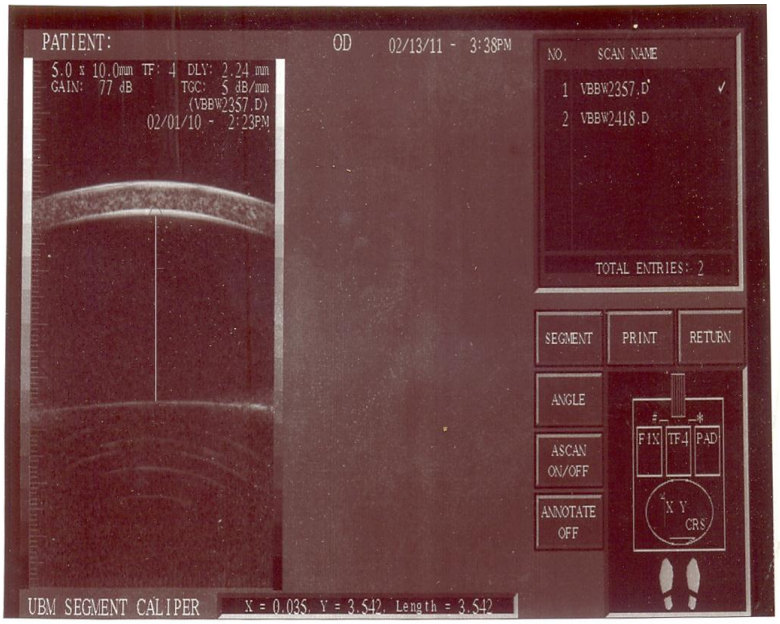
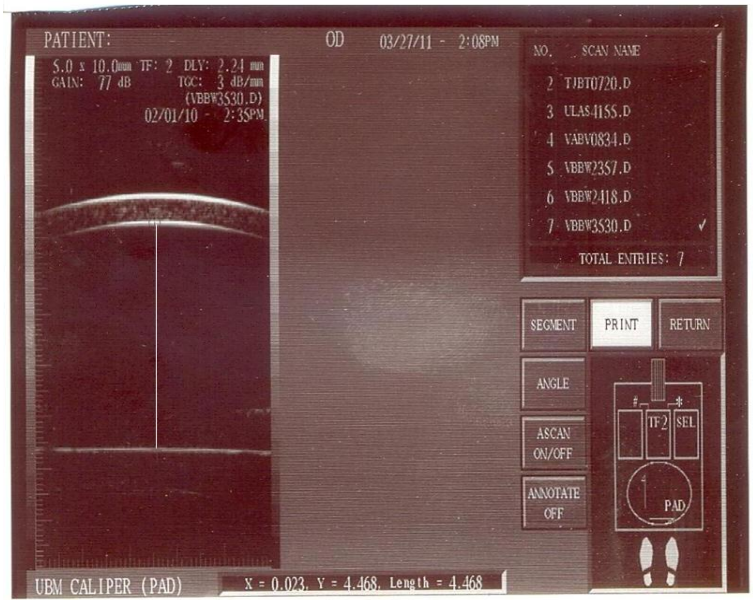


Fig. (38): Mean values of ACD in the study population over the study period.

Figure (39) shows an example of the difference in the anterior chamber depth in case no (5). It demonstrates the change in the depth between the preoperative measurement and the measurement taken at the end of the follow up period. It was 3.542 mm preoperatively **(figure 39a)** while it measured 4.468 mm at three months postoperatively **(figure 39b)**.



(fig. 39a)



(fig. 39b)

Fig. (39): An example of the difference in ACD between preoperative **(fig. 39a)** and postoperative **(fig. 39b)** values.

Angle opening distance (AOD 500 µm) *in nasal quadrant*:

The nasal AOD increased by a mean of 0.16 mm, approximately 34% more than before surgery.

Table (6): Values of nasal AOD (in mm) in the study population throughout follow up with comparing between the preoperative and postoperative values.

NASAL AOD	Mean	±S.D	Test of significance		
			Between	Paired t test	p
Pre operative	0.47	0.13	Pre & 1m post	5.9	<0.001
1m post operative	0.62	0.18	Pre & 3m post	6.2	<0.001
3m post operative	0.63	0.18	1m post & 3m post	0.2	>0.05

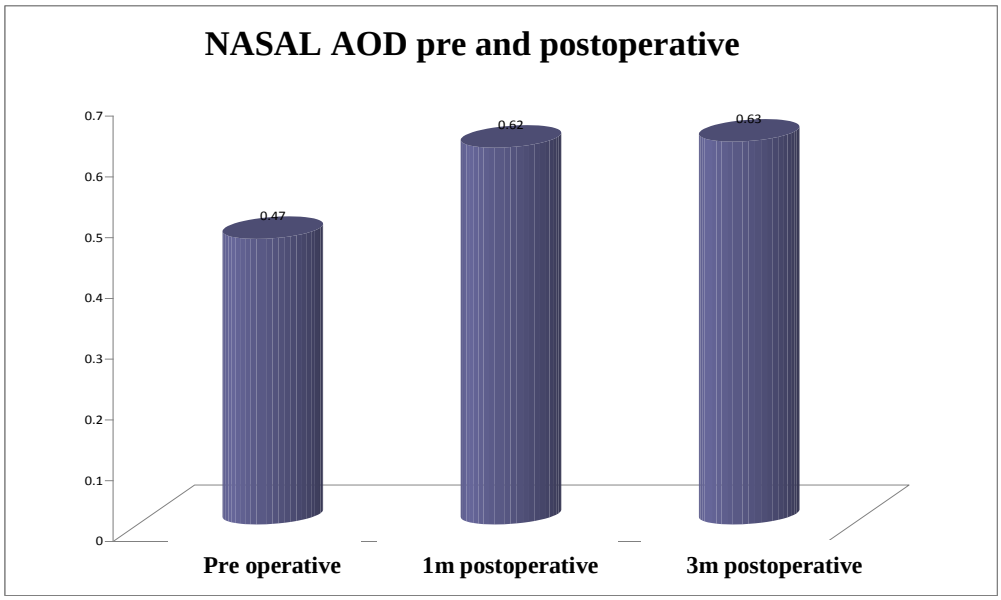
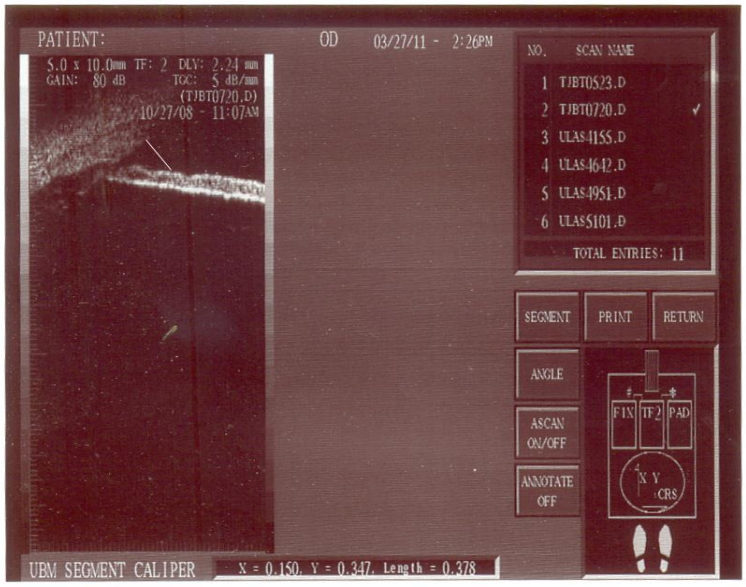
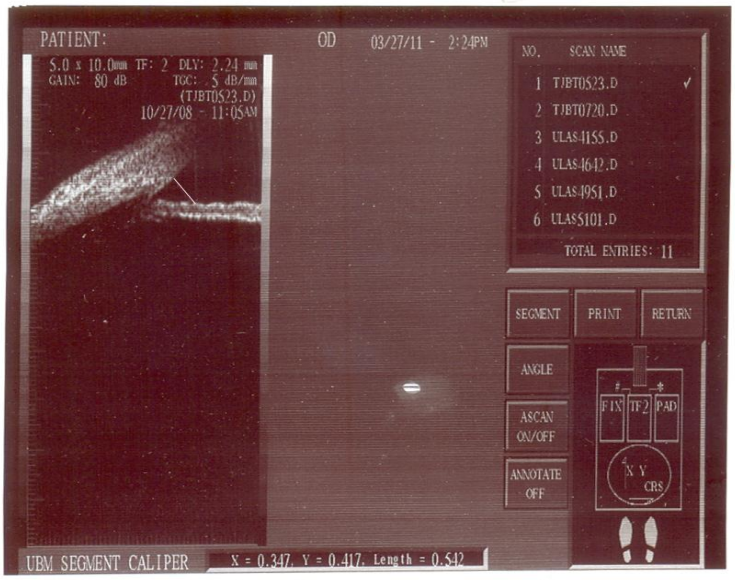


Fig. (40): Mean values of nasal AOD in the study population over the study period.

Figure (41) shows an example of the difference in the nasal angle opening distance 500 µm from the scleral spur in case no (16). It demonstrates the change in the nasal AOD between the preoperative measurement and the measurement taken at the end of the follow up period. It was 0.378 mm preoperatively **(figure 41a)** while it measured 0.542 mm at three months postoperatively **(figure 41b)**.



(fig. 41a)



(fig. 41b)

Fig. (41): An example of the difference in nasal AOD between preoperative **(fig. 41a)** and postoperative **(fig. 41b)** values.

Angle opening distance (AOD 500 µm) *in temporal quadrant*:

The temporal AOD increased by a mean of 0.21 mm, approximately 55% more.

Table (7): Values of temporal AOD (in mm) in the study population throughout follow up with comparing between the preoperative and postoperative values.

TEMP AOD	Mean	±S.D	Test of significance		
			Between	Paired t test	p
Pre operative	0.38	0.08	Pre & 1m post	9.4	<0.001
1m post operative	0.58	0.12	Pre & 3m post	9.8	<0.001
3m post operative	0.59	0.12	1m post & 3m post	0.3	>0.05

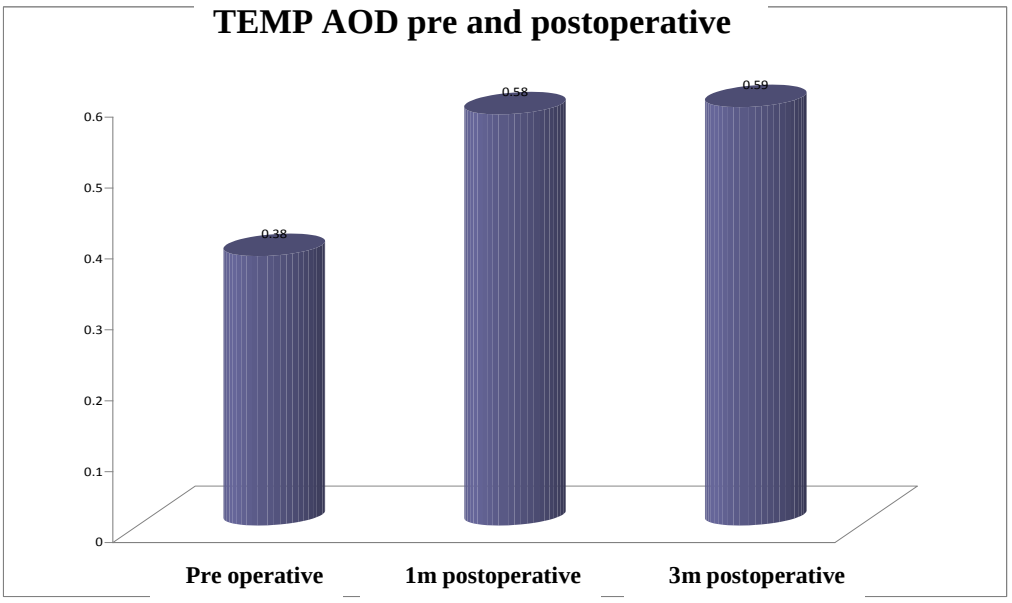
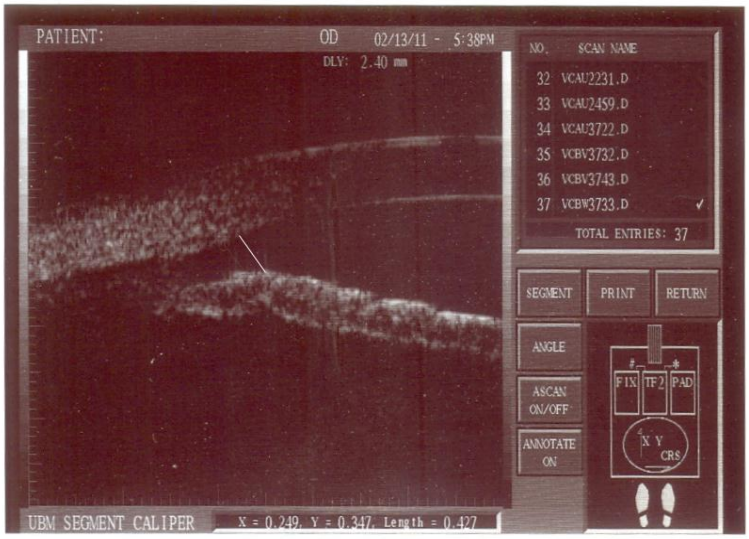
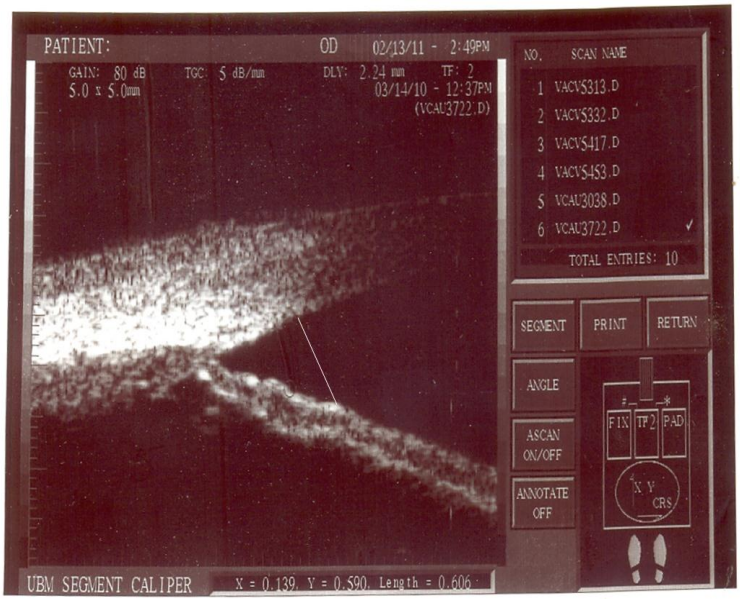


Fig. (42): Mean values of temporal AOD in the study population over the study period.

Figure (43) shows an example of the difference in the temporal angle opening distance 500 µm from the scleral spur in case no (25). It demonstrates the change in the temporal AOD between the preoperative measurement and the measurement taken at the end of the follow up period. It was 0.427 mm preoperatively **(figure 43a)** while it measured 0.606 mm at three months postoperatively **(figure 43b)**.



(fig. 43a)



(fig. 43b)

Fig. (43): An example of the difference in temporal AOD between preoperative **(fig. 43a)** and postoperative **(fig. 43b)** values.

Angle opening distance (AOD 500 µm) *in superior quadrant*:

The superior AOD increased by a mean of 0.18 mm, approximately 40% more.

Table (8): Values of superior AOD (in mm) in the study population throughout follow up with comparing between the preoperative and postoperative values.

SUPERIOR AOD	Mean	±S.D	Test of significance		
			Between	Paired t test	p
Pre operative	0.44	0.12	Pre & 1m post	6.3	<0.001
1m post operative	0.60	0.14	Pre & 3m post	6.3	<0.001
3m post operative	0.62	0.15	1m post & 3m post	1.8	>0.05

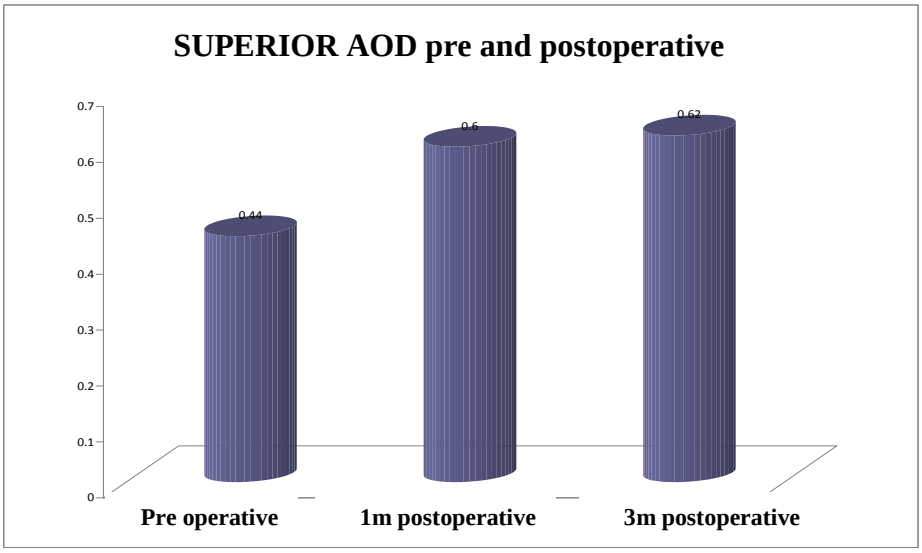
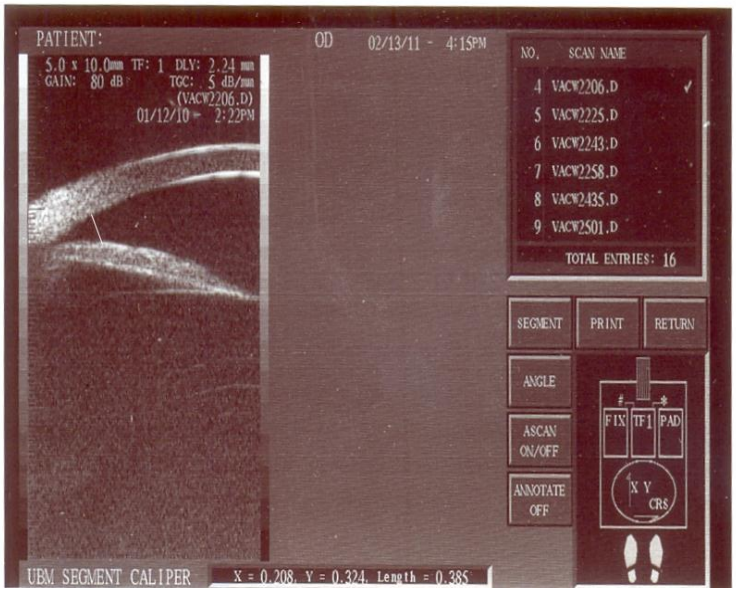
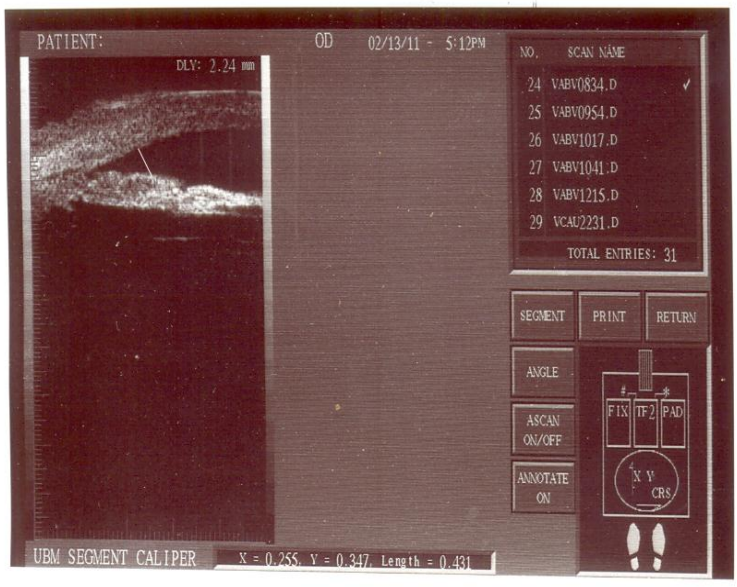


Fig. (44): Mean values of superior AOD in the study population over the study period.

Figure (45) shows an example of the difference in the superior angle opening distance 500 µm from the scleral spur in case no (19). It demonstrates the change in the superior AOD between the preoperative measurement and the measurement taken at the end of the follow up period. It was 0.385 mm preoperatively **(figure 45a)** while it measured 0.431 mm at three months postoperatively **(figure 45b)**.



(fig. 45a)



(fig. 45b)

Fig. (45): An example of the difference in superior AOD between preoperative **(fig. 45a)** and postoperative **(fig. 45b)** values.

Angle opening distance (AOD 500 µm) *in inferior quadrant*:

The mean increase in inferior AOD was 0.1 mm, approximately 19% wider than before surgery.

Table (9): Values of inferior AOD (in mm) in the study population throughout follow up with comparing between the preoperative and postoperative values.

INFERIOR AOD	Mean	±S.D	Test of significance		
			Between	Paired t test	p
Pre operative	0.54	0.07	Pre & 1m post	5.7	<0.001
1m post operative	0.63	0.11	Pre & 3m post	6.1	<0.001
3m post operative	0.64	0.11	1m post & 3m post	0.7	>0.05

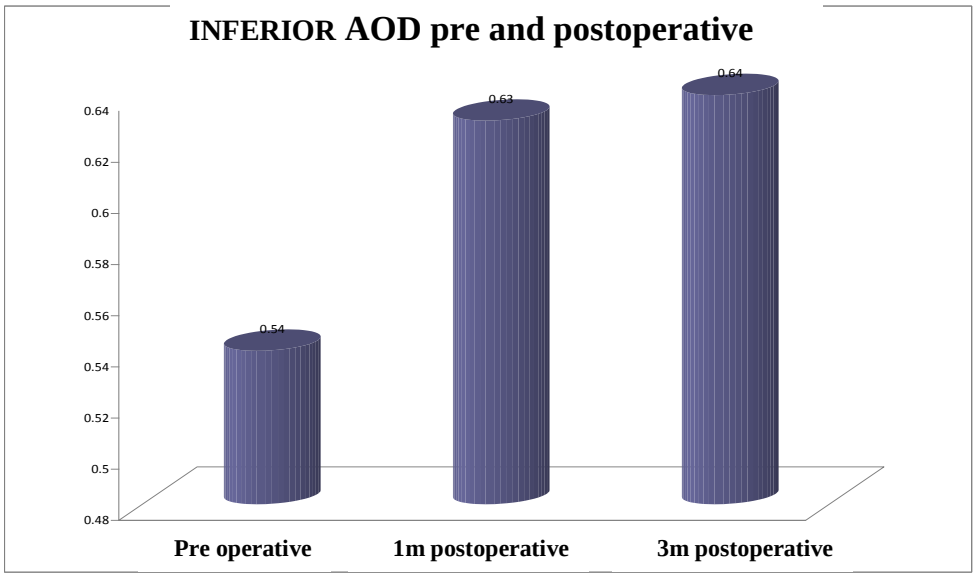
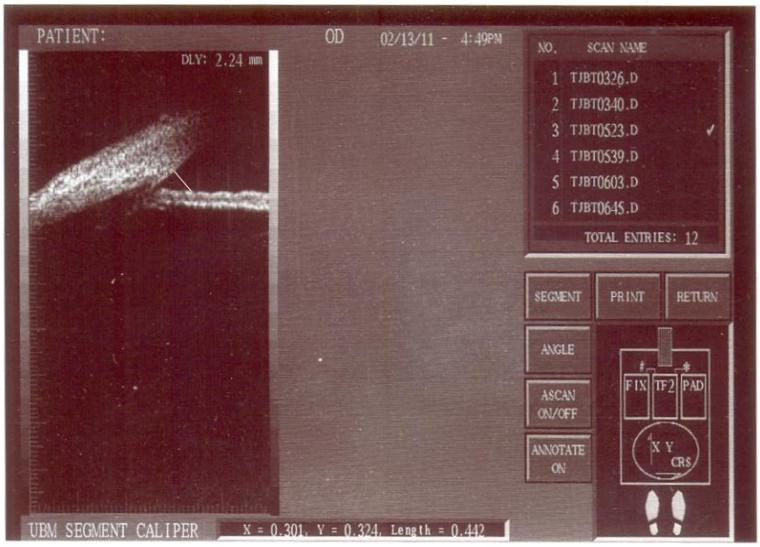
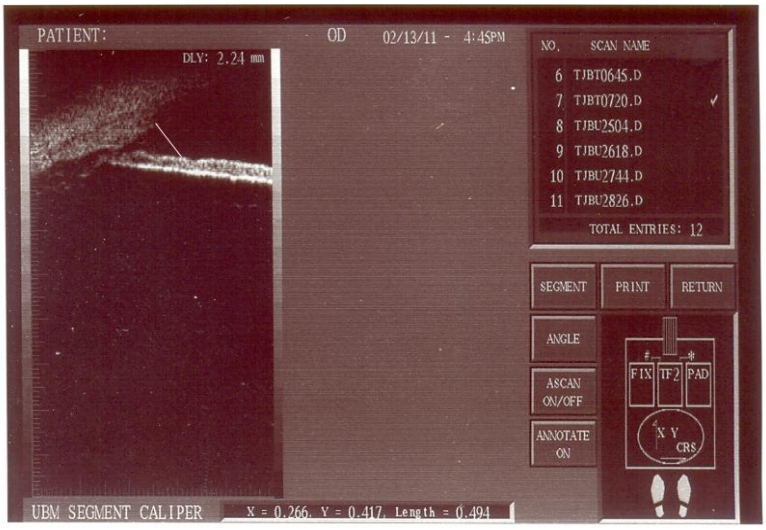


Fig. (46): Mean values of inferior AOD in the study population over the study period.

Figure (47) shows an example of the difference in the inferior angle opening distance 500 µm from the scleral spur in case no (14). It demonstrates the change in the inferior AOD between the preoperative measurement and the measurement taken at the end of the follow up period. It was 0.442 mm preoperatively **(figure 47a)** while it measured 0.494 mm at three months postoperatively **(figure 47b)**.



(fig. 47a)



(fig. 47b)

Fig. (47): An example of the difference in inferior AOD between preoperative **(fig. 47a)** and postoperative **(fig. 47b)** values.

Trabecular – iris angle (TIA) *in nasal quadrant*:

The mean increase in the nasal angle was 8.6°, approximately 23% deeper than before surgery.

Table (10): Values of nasal TIA (in degrees) in the study population throughout follow up with comparing between the preoperative and postoperative values.

NASAL TIA	Mean	±S.D	Test of significance		
			Between	Paired t test	p
Pre operative	37.06	4.16	Pre & 1m post	5.7	<0.001
1m post operative	45.39	9.53	Pre & 3m post	5.8	<0.001
3m post operative	45.65	9.74	1m post & 3m post	1.4	>0.05

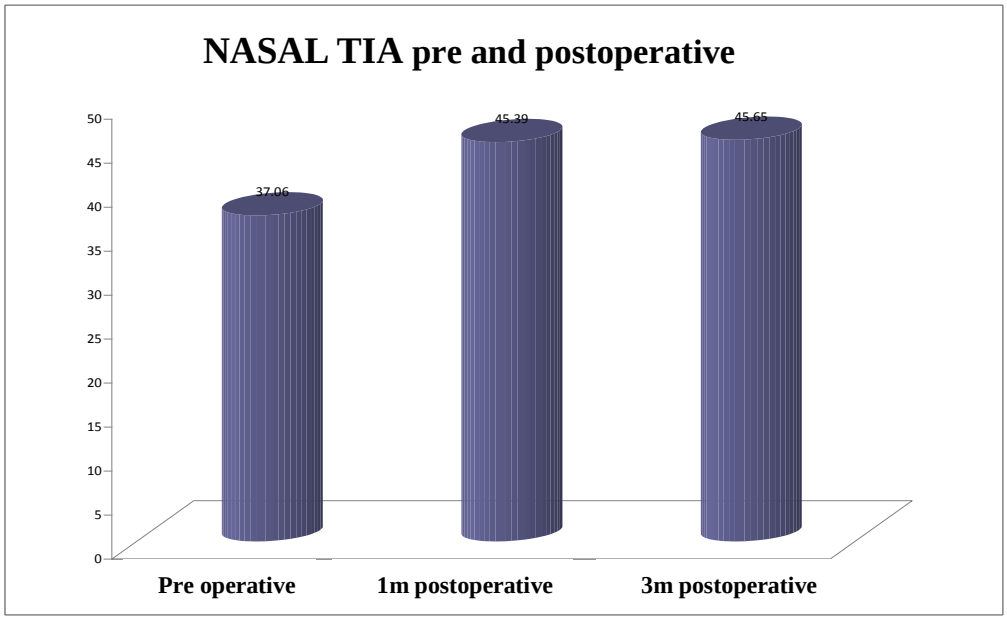
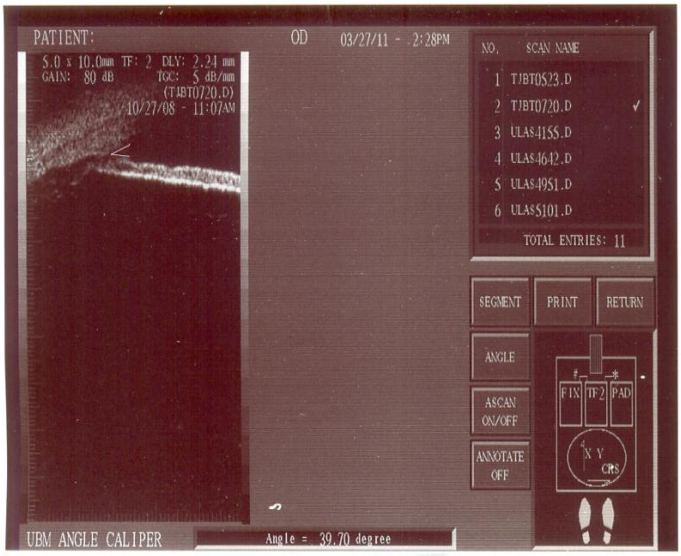
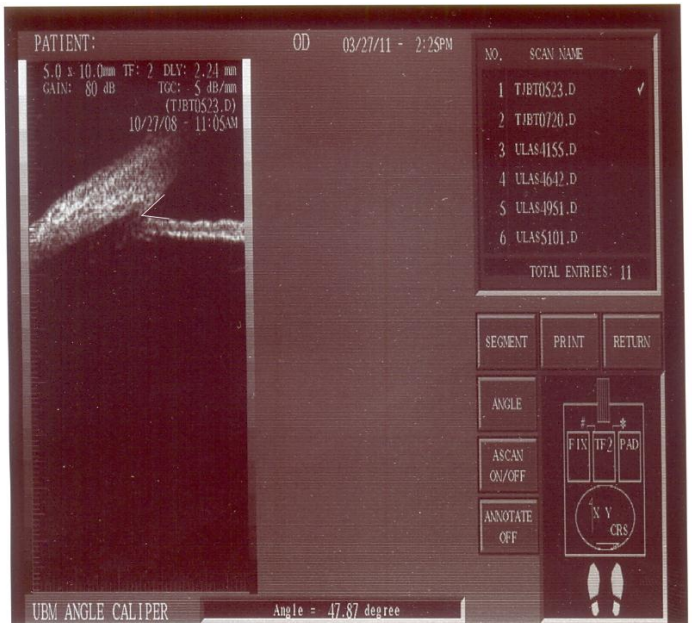


Fig. (48): Mean values of nasal TIA in the study population over the study period.

Figure (49) shows an example of the difference in the nasal trabecular – iris angle in case no (12). It demonstrates the change in the nasal TIA between the preoperative measurement and the measurement taken at the end of the follow up period. It was 39.70º preoperatively **(figure 49a)** while it measured 47.87º at three months postoperatively **(figure 49b)**.



(fig. 49a)



(fig. 49b)

Fig. (49): An example of the difference in nasal TIA between preoperative **(fig. 49a)** and postoperative **(fig. 49b)** values.

Trabecular – iris angle (TIA) *in temporal quadrant*:

The temporal TIA deepened by a mean of 12.82°, approximately 39% wider than before surgery.

Table (11): Values of temporal TIA (in degrees) in the study population throughout follow up with comparing between the preoperative and postoperative values.

TEMP TIA	Mean	±S.D	Test of significance		
			Between	Paired t test	p
Pre operative	32.87	7.59	Pre & 1m post	10.8	<0.001
1m post operative	45.48	6.46	Pre & 3m post	11.1	<0.001
3m post operative	45.69	6.48	1m post & 3m post	0.1	>0.05

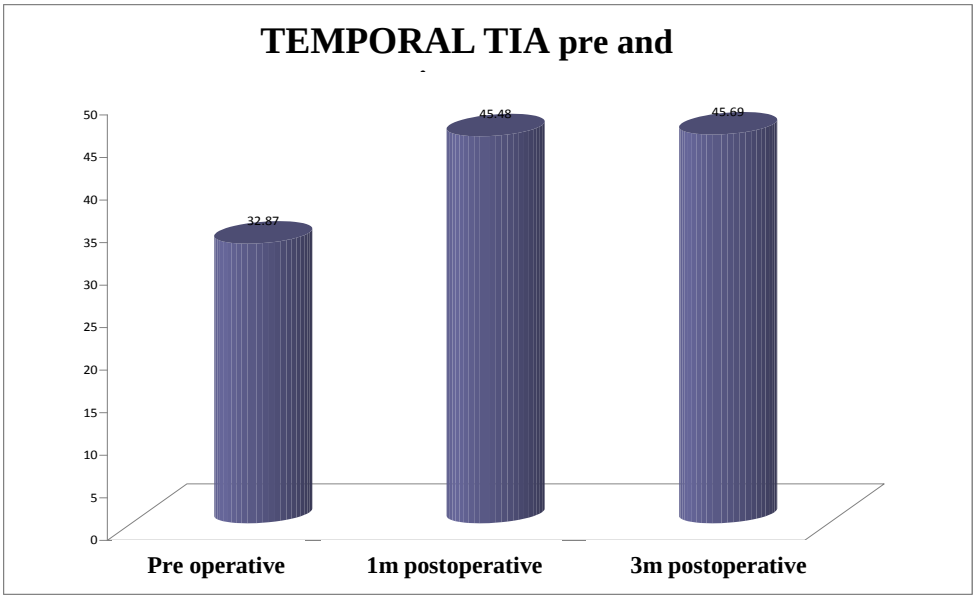
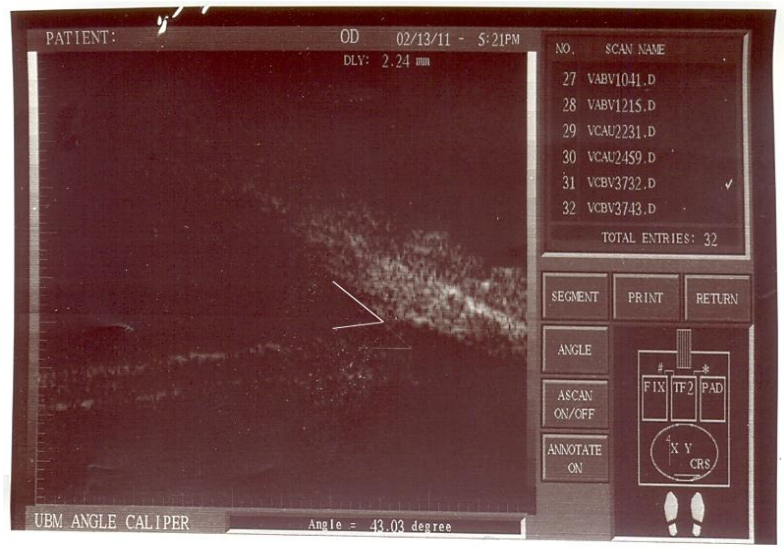
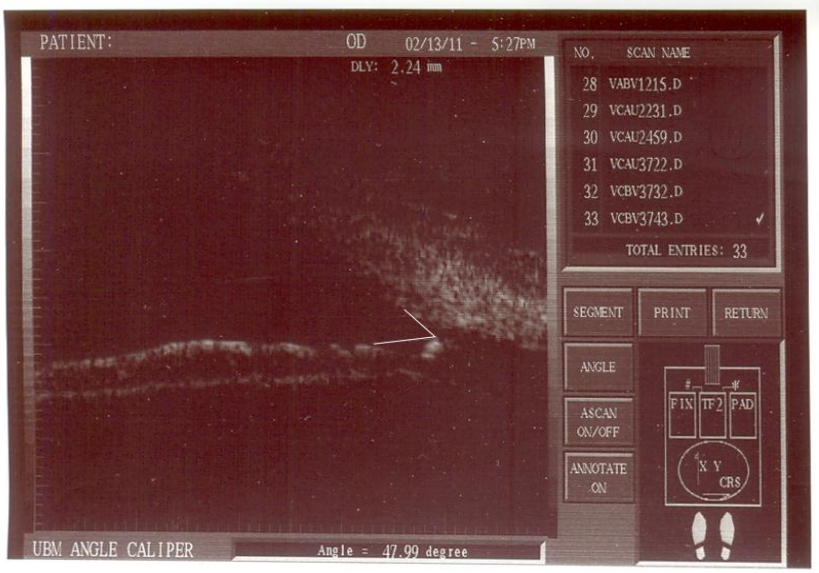


Fig. (50): Mean values of temporal TIA in the study population over the study period.

Figure (51) shows an example of the difference in the temporal trabecular – iris angle in case no (25). It demonstrates the change in the temporal TIA between the preoperative measurement and the measurement taken at the end of the follow up period. It was 43.03º preoperatively **(figure 51a)** while it measured 47.99º at three months postoperatively **(figure 51b)**.



(fig. 51a)



(fig. 51b)

Fig. (51): An example of the difference in temporal TIA between preoperative **(fig. 51a)** and postoperative **(fig. 51b)** values.

Trabecular – iris angle (TIA) *in superior quadrant*:

The superior TIA increased by a mean of 7.53°, approximately 21% wider than before surgery.

Table (12): Values of superior TIA (in degrees) in the study population throughout follow up with comparing between the preoperative and postoperative values.

SUPERIOR TIA	Mean	±S.D	Test of significance		
			Between	Paired t test	p
Pre operative	35.26	6.78	Pre & 1m post	4.2	<0.001
1m post operative	42.69	9.58	Pre & 3m post	4.3	<0.001
3m post operative	42.79	9.57	1m post & 3m post	0.1	>0.05

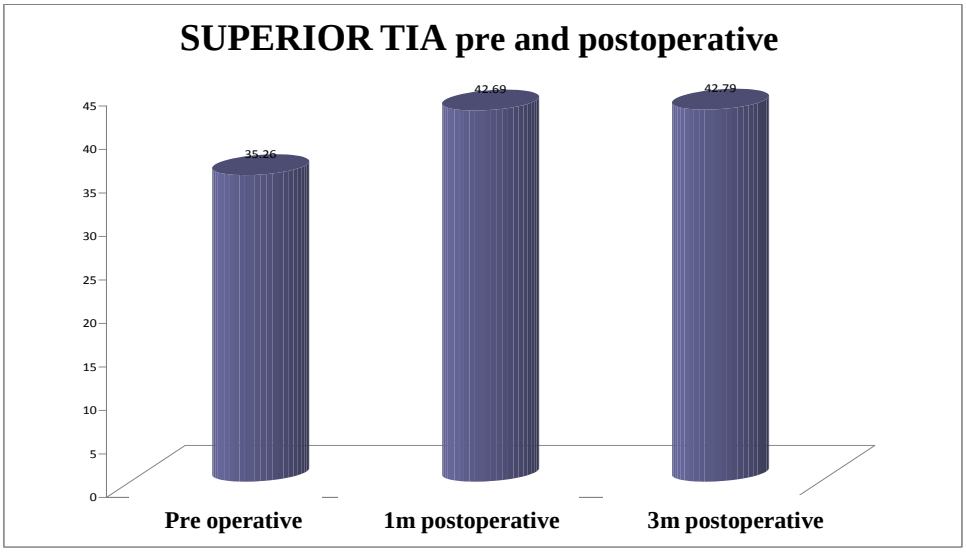
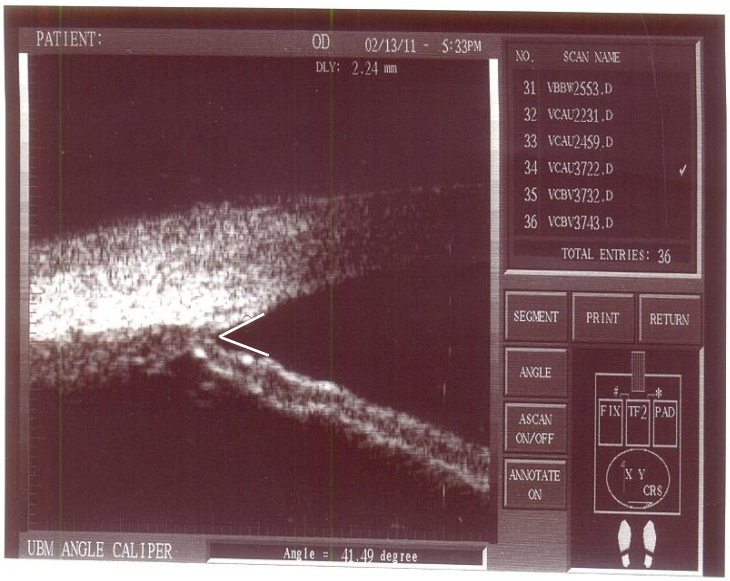
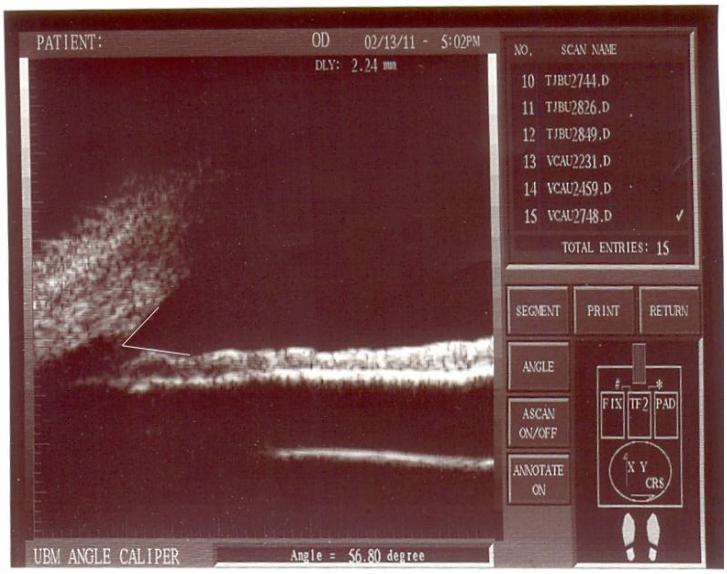


Fig. (52): Mean values of superior TIA in the study population over the study period.

Figure (53) shows an example of the difference in the superior trabecular – iris angle in case no (9). It demonstrates the change in the superior TIA between the preoperative measurement and the measurement taken at the end of the follow up period. It was 41.49º preoperatively **(figure 53a)** while it measured 56.80º at three months postoperatively **(figure 53b)**.



(fig. 53a)



(fig. 53b)

Fig. (53): An example of the difference in superior TIA between preoperative **(fig. 53a)** and postoperative **(fig. 53b)** values.

Trabecular – iris angle (TIA) *in inferior quadrant*:

The inferior TIA increased by a mean of 10.8°, approximately 26% wider than before surgery.

Table (13): Values of inferior TIA (in degrees) in the study population throughout follow up with comparing between the preoperative and postoperative values.

INFERIOR TIA	Mean	±S.D	Test of significance		
			Between	Paired t test	p
Pre operative	41.73	5.62	Pre & 1m post	6.8	<0.001
1m post operative	52.23	5.31	Pre & 3m post	6.9	<0.001
3m post operative	52.53	5.45	1m post & 3m post	1.6	>0.05

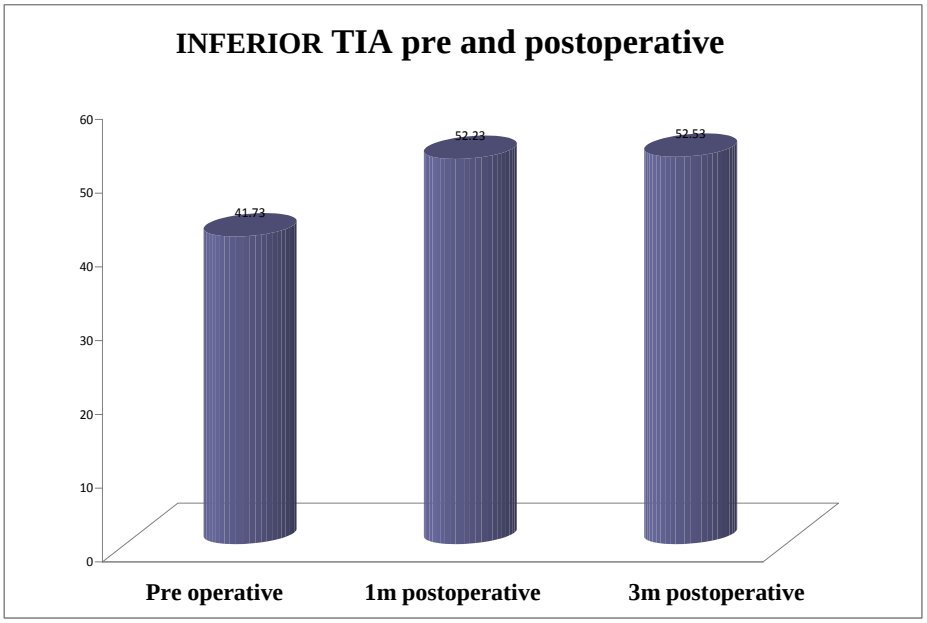
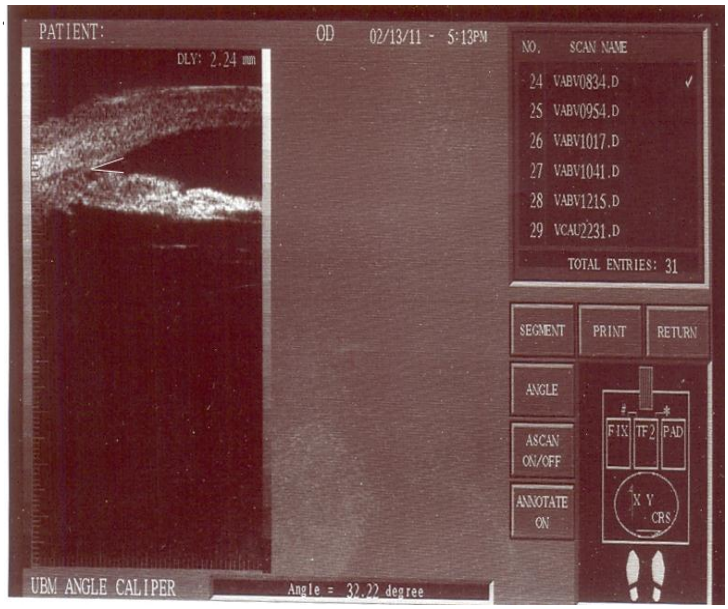
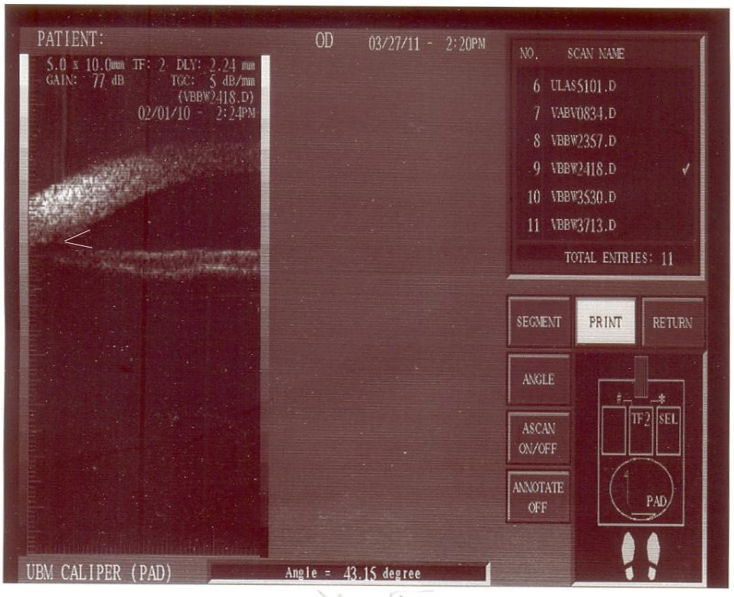


Fig. (54): Mean values of inferior TIA in the study population over the study period.

Figure (55) shows an example of the difference in the inferior trabecular – iris angle in case no (14). It demonstrates the change in the inferior TIA between the preoperative measurement and the measurement taken at the end of the follow up period. It was 32.22º preoperatively **(figure 55a)** while it measured 43.15º at three months postoperatively **(figure 55b)**.



(fig. 55a)



(Fig. 55b)

Fig. (55): An example of the difference in inferior TIA between preoperative **(fig. 55a)** and postoperative **(fig. 55b)** values.

Postoperative measurements

Postoperatively, the diameters of the capsular bags and those of the implanted IOLs were measured in either group then the measured values were statistically analyzed & correlated together.

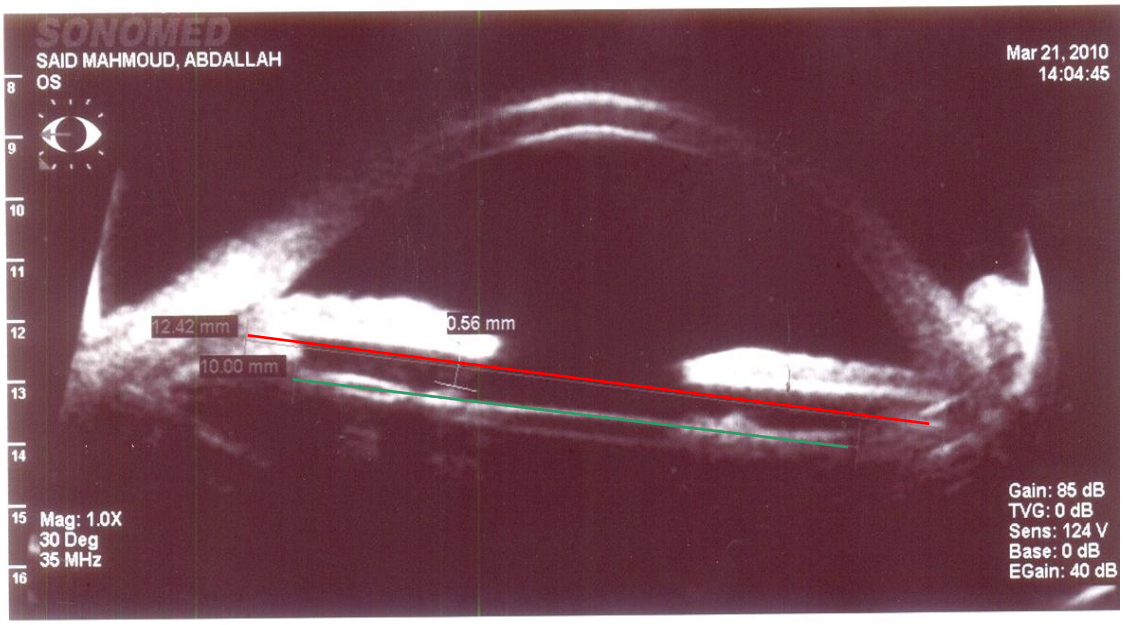


Fig. (56): UBM view of the implanted 1-piece IOL in case no. (1) in group (A), IOL diameter is 10 mm (green) & CBD is 12.42 mm (red).

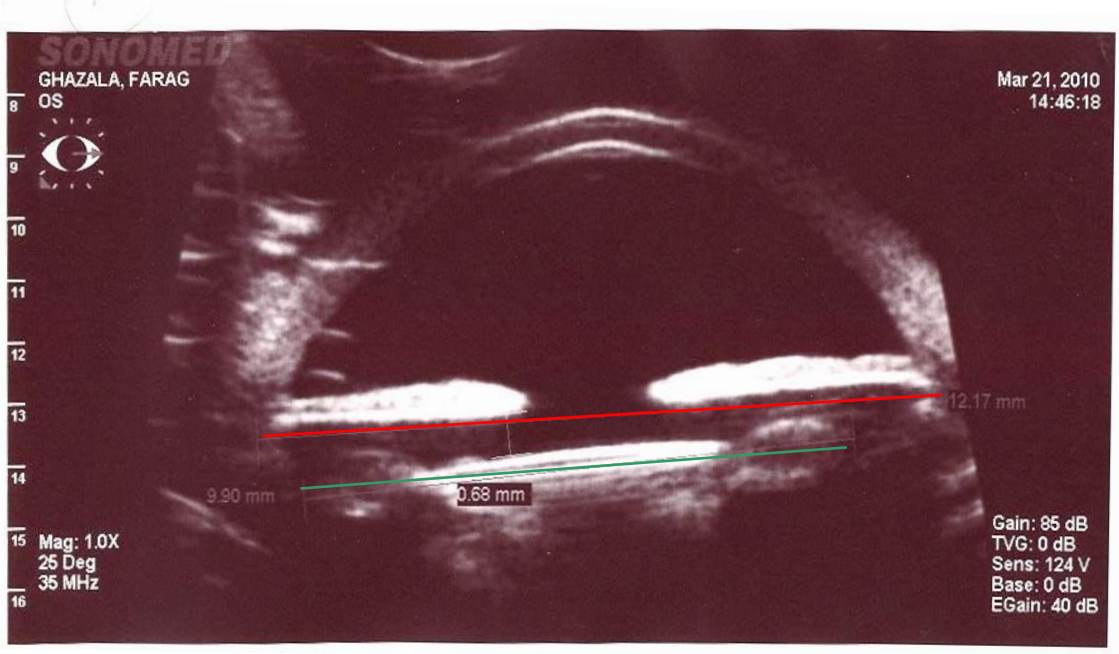


Fig. (57): UBM view of the implanted 1-piece IOL in case no. (3) in group (A), IOL diameter is 12.17 mm (green)& CBD is 9.9 mm (red).

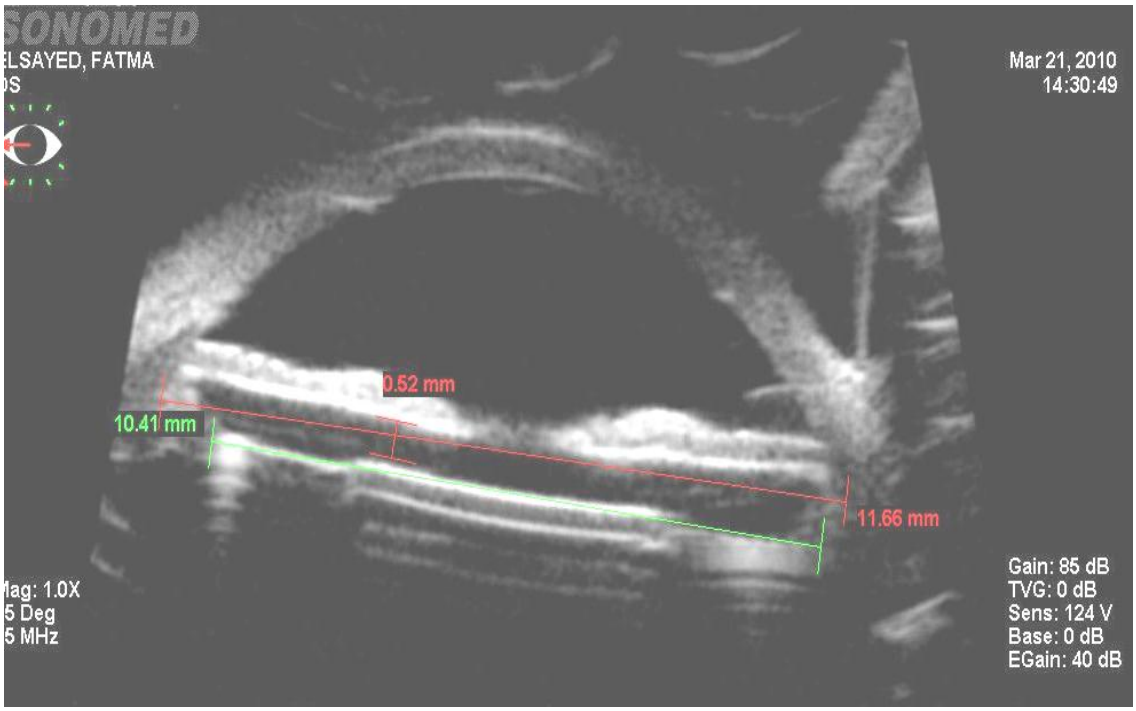


Fig. (58): UBM view of the implanted 3-piece IOL in case no. (16) in group (B), IOL diameter is 10.41 mm (green) & CBD is 11.66 mm (red).

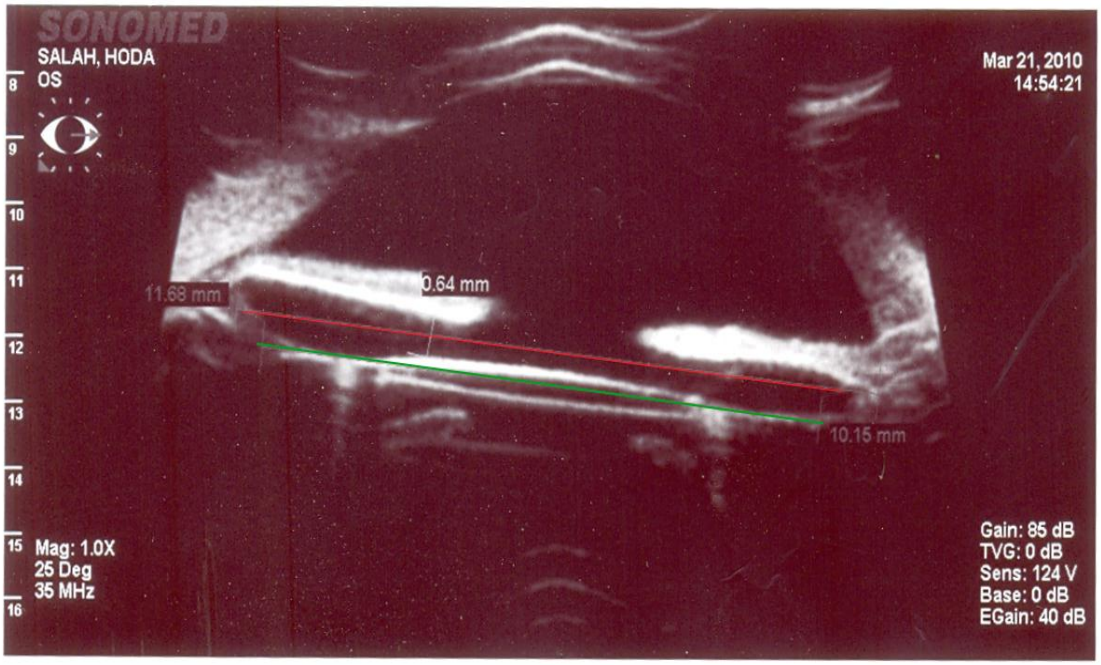


Fig. (59): UBM view of the implanted 3-piece IOL in case no. (18) in group (B), IOL diameter is 10.15 mm (green) & CBD is 11.68 mm (red).

Table (14): Range; mean (± SD) of capsular bag diameter in mm among the study groups.

Group \ CBD	Mean	±Standard Deviation
Group A	11.978	0.65
Group B	11.402	0.72
t	1.9	
P	>0.05	

The measured values of the capsular bag diameter in groups (A) & (B) were not statistically different i.e. no significant between group difference.

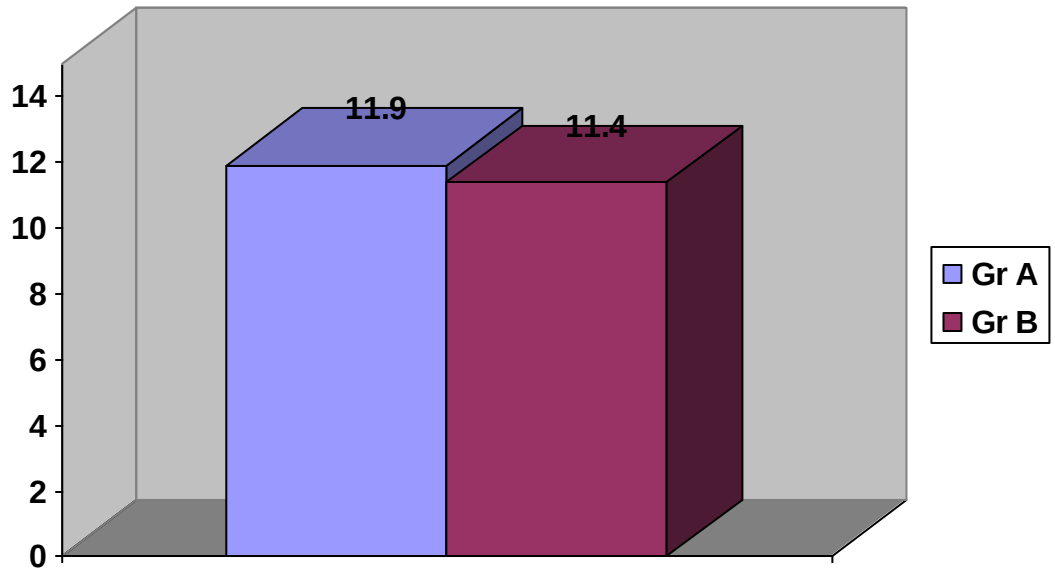


Fig. (60): Mean values of capsular bag diameter in the study groups; (A&B).

Table (15): Range; mean (± SD) of IOL diameter in mm among the study groups.

IOL diameter / Group	Mean	±Standard Deviation
Group A	10.01	0.31
Group B	10.4	0.42
t	4.2	
P	<0.05	

On comparing the values of the measured diameters of the implanted IOLs, groups (A) & (B) were statistically different i.e. there was a significant between group difference.

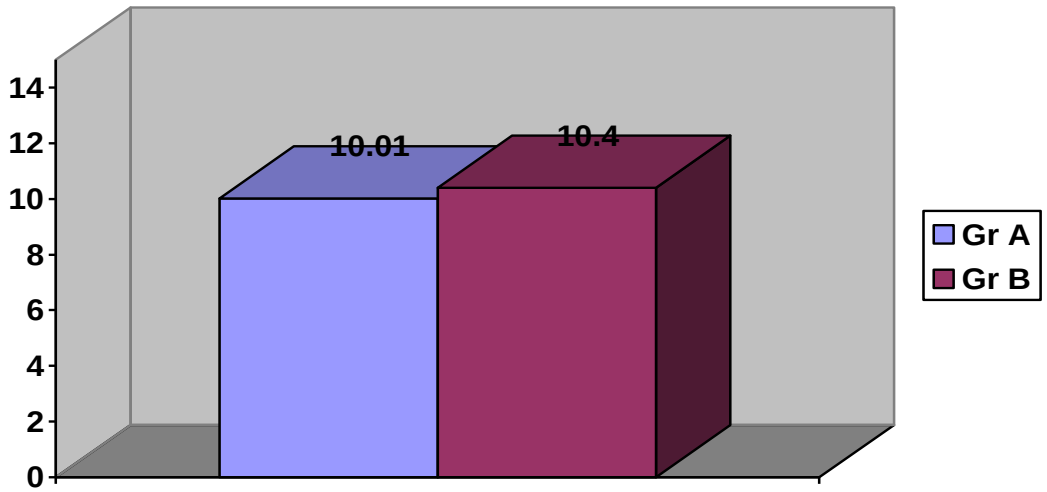


Fig. (61): Mean values of IOL diameter in the study groups; (A&,B).

Table (16): Correlation between capsular bag and IOL diameters in the study groups (A & B).

Correlation / Studied group	r (correlation coefficient)	p
Group (A)	-0.56	<0.05
Group (B)	0.86	<0.001

In group (A), a statistically significant negative correlation was found between the diameters of the capsular bags and the diameters of the implanted one – piece IOLs. The correlation coefficient (**r**) is – 0.56.

In group (B), a statistically significant positive correlation was found between the diameters of the capsular bags and the diameters of the implanted three – piece IOLs. The correlation coefficient (**r**) is 0.86.

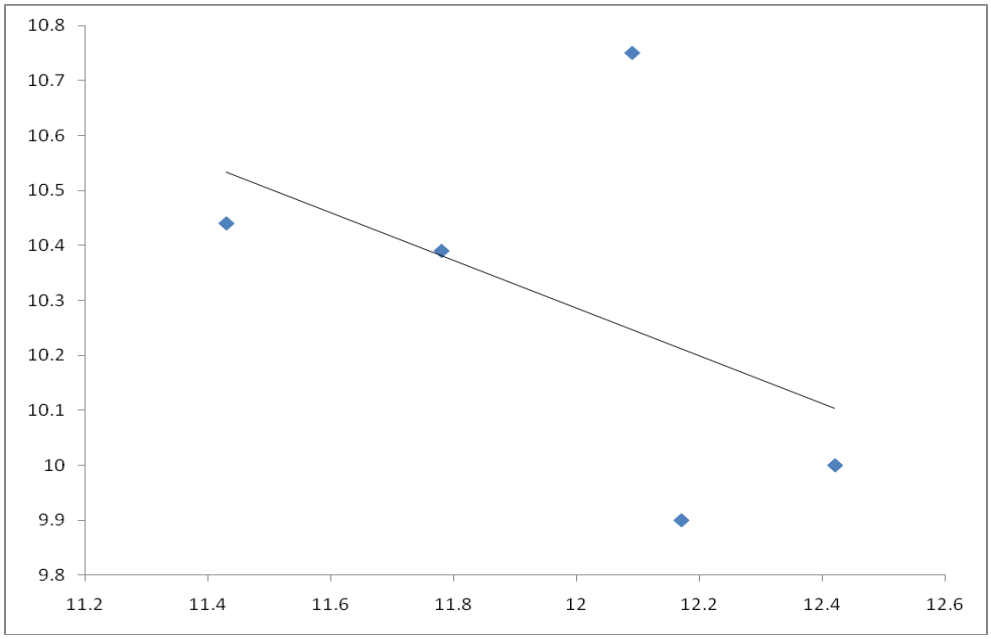


Fig. (62): Correlation between capsular bag diameter and IOL diameter in group (A).

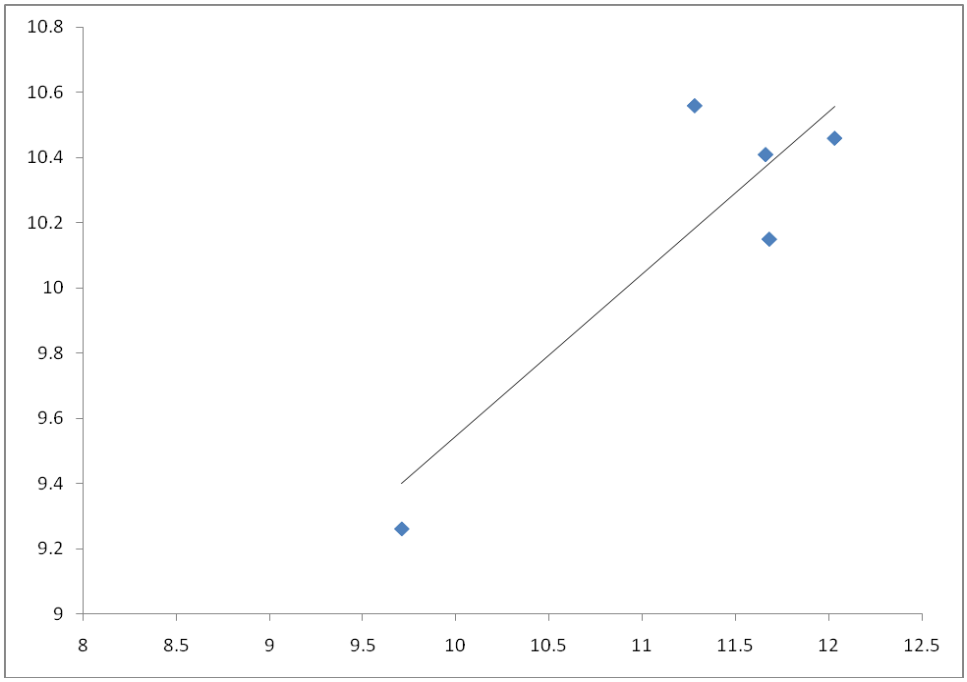


Fig. (63): Correlation between capsular bag diameter and IOL diameter in group (B).

Table (17): Correlation between capsular bag diameter and white to white distance in the study groups (A & B).

Correlation / Studied group	r (correlation coefficient)	p
Group (A)	0.77	<0.01
Group (B)	0.61	<0.01

In both groups, a statistically significant positive correlation was found between the capsular bag diameter and the white to white distance.