

OUTCOMES OF YAMANE TECHNIQUE FOR INTRAOCULAR THREE-PIECE LENS IMPLANTATION IN PATIENTS WITH MARFAN SYNDROME

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ABSTRACT

Aim: to explore safety and efficacy of Yamane technique for intraocular three-piece lens implantation in patients with Marfan syndrome in relation to clinical and refractive outcomes. **Method:** this retrospective study was conducted at the ophthalmology clinic of King Hussein Medical center between January 2020 and June 2025. All patients who had subluxated lens as a manifestation of Marfan syndrome and requiring phacoemulsification using Yamane technique for intraocular lens implantation were involved in the study. The demographic features of the patients were recorded regarding age, gender and past medical and surgical history. The outcome of ocular examination including Best corrected visual acuity (BCVA), anterior and posterior eye segment examination, intra ocular pressure (IOP) measurement, and refraction before and after surgery were reported and compared. The obtained data were reviewed and analyzed using descriptive analysis and t-test.

Results: Twenty patients (30 eyes) aged between 14 and 26 years (mean 17.5 ± 3.2 years) were included in the study 50.0% of them were males. Phacoemulsification and Yamane IOL fixation was performed to all patients, the mean duration of surgery was 25.5 ± 5.3 minutes (Range 15.3-29.4 minutes). Complications occurred in 10 eyes (33.3%); Zonular dialysis, Posterior capsule rupture, and hyphema were the most common. Significant improvement (P-Value < 0.05) in BCVA and mean refractive error was noted at six months (0.9 and -0.30) when compared to the baseline levels (0.15 and -8.5). without any significant changes (P-value > 0.05) in central corneal thickness (CCT), endothelial cell count (ECC), and intra ocular pressure (IOP). **Conclusion:** 3-piece IOL implantation was effectively used in the management of IOL subluxation among patients with Marfan syndrome with excellent safety profile.

KEYWORDS: Lens subluxation, Marfan syndrome, Yamane technique.

INTRODUCTION

Marfan syndrome is one of the rare inherited diseases caused by a mutation of FBN1 gene.^[1] Its prevalence ranges from 1 in 5000 to 1 in 15,400 people.^[2,3] It is characterized by malformations in the heart and muscular skeletal system.^[4] Ocular involvement is very common occurring in more than two thirds of the patients.^[5] Superior-temporal lens subluxation is a very characteristic feature of Marfan syndrome.^[6] Lens subluxation is attributed to the weakness of the lens zonules.^[7] Other ocular manifestations of Marfan include myopia, cataract, glaucoma, and retinal detachment.^[8] Surgical intervention for lens subluxation is very challenging because of capsule instability.^[9]

In 2017 Yamane presented a new technique for sutureless intrascleral posterior chamber IOL fixation with low rates of complication.^[10] This technique was adopted

to be used at King Hussein Medical Center for treatment of patients with aphakia or subluxated lens including Marfan syndrome. Unfortunately, there are no studies conducted to explore the ocular and non-ocular features of Marfan syndrome in Jordan.

The aim of this study to explore safety and efficacy of Yamane technique for intraocular three-piece lens implantation in patients with Marfan syndrome in relation to clinical and refractive outcomes.

METHODS

This retrospective study was conducted at the ophthalmology clinic of King Hussein Medical center between January 2020 and June 2025. All patients who were known to have Marfan Syndrome with subluxated lens and underwent lens extraction using phacoemulsification technique and intraocular three-piece

lens implantation using Yammane Technique were enrolled in the study. The demographic features of the patients were recorded including age, gender and past medical and surgical history. The outcome of ocular examination including Best corrected visual acuity and refraction before and after surgery were reported and compared. The obtained data were reviewed and analyzed using descriptive analysis and t-test.

Table 1: the demographic features of the patients.

	Number	Percentage
Number of patients	20	100%
Mean age	17.5±3.2 yrs	
Number of eyes	30	100%
males	10	50%
Right eye involvement	16	53.3%
cataract	18	60.0%
Extra ocular abnormalities	15	75.0%

Phacoemulsification and Yammane IOL fixation was performed to all patients, the mean duration of surgery was 25.5±5.3 minutes (Range 15.3-29.4 minutes).

RESULTS

Twenty patients (30 eyes) aged between 14 and 26 years (mean 17.5±3.2 years) were included in the study 50.0% of them were males. Table summarizes the demographic features of the patients.

Complications occurred in 10 eyes (33.3%). Table 2 summarizes the intra operative complications encountered among the patients.

Table 2: types of intra operative complications.

Type	Number	Percentage
Zonular dialysis	3	10.0%
Posterior capsule rupture	2	6.7%
hyphema	2	6.7%
Iris trauma	1	3.3%
IOL malposition	1	3.3%
Broken haptic	1	3.3%
Kinked IOL haptic	1	3.3%

Significant improvement in BCVA and mean refractive error was noted at 1,3, and six months when compared to the baseline levels without any significant changes in

central corneal thickness (CCT), endothelial cell count (ECC), and intra ocular pressure (IOP). The results of post surgical outcome are summarized in table 3.

Table 3: Mean BCVA, refractive error, CCT, ECC, and IOP before and after surgery.

	baseline	1month post op	3months post op	6months post op	P-avalue
BCVA Snellen	0.15	0.3	0.5	0.9	<0.05
Mean refractive error	-8.5±3.2	-0.5±1.2	-0.4±0.9	-0.3±0.5	<0.05
Central corneal thickness	540 µm	532 µm	531 µm	530 µm	>0.05
endothelial cell count	2782 cell/mm2	2523 cell/mm2	2499cell/mm2	2495 cell/mm2	>0.05
IOP (mmHg)	13.2	16.5	15.5	15.9	>0.05

DISCUSSION

This study explored the safety and efficacy of using Yammane technique for treating subluxation lenses with 3-piece IOL implantation. In this study the mean age of the patients was 17.5 years. This aligns with what is found globally in that most of patients with Marfan syndrome start to have visual symptoms in early childhood and adolescence.^[11] 50.0% of patients were males, this equal distribution is due to the inheritance of Marfan syndrome is autosomal dominant and not gender related.^[12]

Intra operative complications were relatively common in this study but it was comparable to other global studies.

The most common complications encountered in our study was zonular dialysis followed by posterior capsule rupture and hyphema. This high rate of complications is attributed to the preoperative existence of zonular weakness.^[13] Similarly, IOL malposition, kinked IOL haptics and broken haptics complications were encountered at low rates which did not exceed the rates found in global studies. Global studies reported that haptic complications occurred in 3-8% of cases in Yammane procedure.^[14] Those complications were considered as surgical difficulties which might be faced in Yammane techniques and were described in other studies. The rates are relatively low due

to the improvement in surgical skills gained form continuous exposure during our clinical practice.

Regarding BCVA, the vision improved form 0.15 before surgery to 0.9 at six months after surgery. When compared to other studies, which ranged between 0.6 and 0.8^[15], our study showed better visual outcome probably due to lower mean age of patients and earlier surgical intervention. The improvement of BCVA was accompanied with great improvement in the degree of refractive errors (8.2 D) which reflects the efficient preparation of patients and success of surgical intervention which were comparable to previous studies.^[16]

Regarding CCT and ECC there was a drop in CCT and ECC after surgery but this was not statistically significant and this drop is expected during any phaco emulsification surgery and not only while using Yamane technique.^[17] After 6 months, the cornea continued to be functionally and anatomically stable.

Finally, the IOP remained within normal limits before surgery and up to six months of follow-up after surgery. Global studies showed that sutureless scleral fixation IOL are not associated with higher risks of glaucoma.^[18]

CONCLUSION

Our study showed that subluxated lens in patients with Marfan syndrome was effectively and successfully treated by phacoemulsification and 3-piece IOL implantation using Yamane technique with low rates of complications which were manageable.

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