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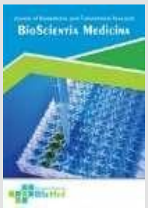

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# How to Fit Toric Soft Contact Lenses?

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**A B S T R A C T**

**Background:** Refractive error is the first cause of visual impairment and the second cause of vision loss worldwide. Astigmatism is an eye refraction disorder that is characterized by various degrees of refraction in various meridians. Thus, the parallel rays coming into the eye are not focused on one point. One of the treatments is toric soft contact lenses, which is used in astigmatism patients by 47% with astigmatism above 0.75 D. This case report describes the use of toric soft contact lenses using a trial with markers at 6 o'clock, 3 o'clock, and 9 o'clock for the management of regular astigmatism. **Case presentation:** In this paper, we report 3 cases of patients using toric soft contact lenses. The first patient was a 29-year-old male, the second patient was a 24-year-old female, and the third patient was a 25-year-old male with slowly blurred vision in both eyes and had been wearing glasses. The three cases were classified as moderate astigmatism with a power of 1.25 D and 1.50 D. The patients were given toric soft contact lenses for correction. Contact lens fitting was performed on the patient. **Conclusion:** Correction of astigmatism can be done by giving glasses, contact lenses, or refractive surgery. If the contact lens axis is suitable, a prescription can be given immediately. If the axis of the toric soft contact lens does not match the available trials, it is necessary to order the size of the toric contact lens according to the astigmatism disorder in the patient's eye.

## 1. Introduction

Refractive error is the first cause of visual impairment and the second cause of vision loss worldwide. Approximately 43% of visual impairment is associated with refractive errors.[1] Uncorrected refractive errors can cause visual impairment in 101.2 million people and blindness in 6.8 million people.[2] Treatment of astigmatism correction can use glasses, contact lenses, or refractive surgery. Toric contact lenses are used for astigmatism correction.[3,4] As many as 25% of patients with astigmatism >0.75D use soft toric contact lenses.[5] The emergence of new technologies and techniques allows toric lenses to stay well-hydrated and provide optimal visual acuity. The study aims to discuss case reports on the use of toric soft contact lenses using trials with markers at 6, 3, and 9 o'clock for the management of regular astigmatism.

## 2. Case Presentation

### Case 1

A man, aged 29 years, with a chief complaint of blurred vision in both eyes since 8 years ago, has been getting worse in the past 2 years, accompanied by frequent headaches. The patient was known to have nearsightedness and astigmatism and had been wearing glasses, but in the last 1 year, he had felt uncomfortable. There were no complaints of red eyes and no history of trauma. There was a history of wearing glasses with size (OD: S-0.75 C-1.00(180) and

OS: S-0.50 C-0.75(180)). From the ophthalmology status, the visual acuity of OD was 20/70, and the visual acuity of OS was 20/60, with correction of cc S-0.75 C-1.25(180), and the visual acuity of ODS became 20/20. Another ophthalmologic status is within normal. The patient's diagnosis was ODS compound myopic astigmatism. Then, the patient is fitted using a toric soft contact lens trial on ODS with power S-0.75, axis C-1.25(180), BC of 8.7, and D of 14.5 mm.

Figure 1. Image of the 1st patient's both eyes.

A B

Figure 2. Toric soft contact lenses; A) Correct position of soft contact lenses; B) Incorrect contact lens position, looks like a plate.

A B

Figure 3. Overview marker (yellow arrow) of toric soft contact lenses; A) The position of the marker on the toric soft contact lens shows the direction of 6 o'clock before the eye blinks; B) Position marker at 6 o'clock after blinking.

The results of the fitting of the two eyes showed that the markers at 6 o'clock, 9 o'clock and 3 o'clock remained stable after the patient blinked. This indicated that the two eyes of the patient had an axis that corresponded to the available toric soft contact lens trials, and then Best Correction Visual Acuity (BCVA) was performed after using 20/20 vision toric contact lenses. The patient was given a toric contact lenses prescription according to toric soft contact lens trial that has power of S-0.75, axis C-1.25(180), Best Curve (BC) of 8.7, and diameter(D) of 14.5 mm.

**Case 2**

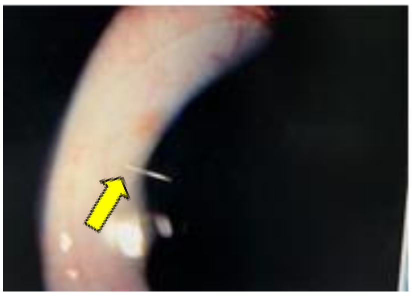
A woman, 24 years old, with a chief complaint of blurred vision in both eyes since 4 years ago. Patients often experience headaches. The patient had been known to be nearsighted for 2 years and has been using glasses. However, in the last 6 months, she had felt less comfortable. There were no complaints of red eyes and no history of trauma. There was a history of wearing glasses with size (OD: S-1.00 C-1.00 (180) and OS: S-0.75 C-0.75 (180)). From ophthalmology status, the visual acuity of OD was 20/50, cc S-1.25, C-1.50(10) to 20/20. The visual acuity of OS was 20/60 cc S-1.50 C-1.25(170) to 20/20. Another ophthalmologic status was within normal. She was diagnosed with ODS compound myopic astigmatism. Then, the patient is fitted using a toric soft contact lens trial on OD with power S-1.25, axis C-1.50(180), BC of 8.7, and D of 14.5 mm, and OS with power S-1.50, axis C-1.25(180), BC of 8.7, and D of 14.5 mm.

Figure 4. Image of the 2nd patient's both eyes.

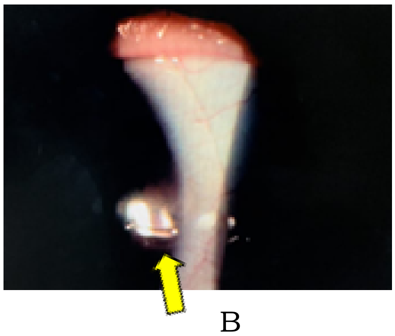
The results of fitting the right eye showed that the marker at 9 o'clock and 3 o'clock had shifted clockwise and then calculated using the CAAS (clockwise add, anticlockwise subtract) method. A 5-minute marker shift was interpreted as having an axis of 30$^{0}$, and in the right eye, the results of a shifted mark occurred around 1 minute (Figures 5A and 5B). The 6 o'clock marker shifted to the left or clockwise and then was calculated using the LARS (Left Add, Right Subtract) method to get a marker shift of about 1 minute. Therefore, for the right eye, an axis is about 6$^{0}$.

The result of fitting the left eye showed that the marker at 9 o'clock and 3 o'clock shifted anticlockwise and was calculated using the CAAS (clockwise add, anticlockwise subtract) method. The results of the marker shift occurred in about 1 minute. The 6 o'clock marker shifted to the right or anticlockwise and was calculated using the LARS (left add, right subtract) method to get an axis of around 1 minute (Figure 5C). Therefore, for the right eye, an axis of 174$^{0}$ was obtained.

In this patient, the axis of the toric contact lens trial did not match the refractive error in the patient's eye. Thus, BCVA calculations could not be performed. The patient could be prescribed toric contact lenses according to the conversion of the vertex distance (VD) and the axis adjusted according to the fittings on the toric contact lens trial. So, the prescription can be given at toric soft contact lens OD with the power S-1.25, axis C-1.50 (10), BC of 8.7, D 14.5 mm and OS with the power of S-1.50, axis C-1.25 (170), BC of 8.7, and D of 14.5 mm.



A



B

C

Figure 5. Marker (yellow arrow) on toric soft contact lenses after blinking; A) Marker at 9 o'clock in the right eye; B) Marker at 3 o'clock in the left eye; C) Marker at 6 o'clock in the left eye.

**Case 3**

A 25-year-old man came with a chief complaint of blurred vision since the patient was 15 years old. Patients often experience headaches. The patient was known to be nearsighted and astigmatic, and if not wearing glasses, he could only see with a finger count. The patient had been wearing glasses for nearsightedness for 10 years. However, in the last 1 year, he felt uncomfortable. There were no complaints of red eyes and no history of trauma. There was a history of wearing glasses with size (OD: S-7.25 C-1.00 (180) and OS: S-7.50 C-1.75 (180)). From the ophthalmological status, the visual acuity of OD was 2/60 cc S-7.00 C-1.50(20) and became 20/20, and the visual acuity of OS was 1/60 cc S-7.00 C-1.50(150) became 20/20. Another ophthalmologic status was within normal limits. He then was diagnosed with ODS compound myopic astigmatism. Then, the patient is fitted using a toric soft contact lens trial on OD with power S-6.50, axis C-1.25(180), BC of 8.7, and D of 14.5 mm, and OS with power S-6.50, axis C-1.25(180), BC of 8.7, and D of 14.5 mm.

Figure 6. Image of the 3rd patient's both eyes.

The results of fitting the right eye showed that the marker at 9 o'clock and 3 o'clock had shifted clockwise and was calculated using the CAAS method. The result of the marker shift occurred in about 3 minutes

(Figure 7A). The 6 o'clock marker shifted to the left or clockwise and was calculated using the LARS method to obtain about. Therefore, an axis of $18^0$ was obtained for the right eye (Figure 7B).

The results of fitting the left eye showed that the marker at 9 o'clock and 3 o'clock had shifted anticlockwise and was calculated using the CAAS method. The results of the marker shift occurred in about 5 minutes or around $150^0$ (Figure 7C). The 6 o'clock marker shifted to the right or counterclockwise and was calculated using the LARS method to obtain an axis of $150^0$ (Figure 7C). Therefore, for the left eye, an axis of $150^0$ was obtained.

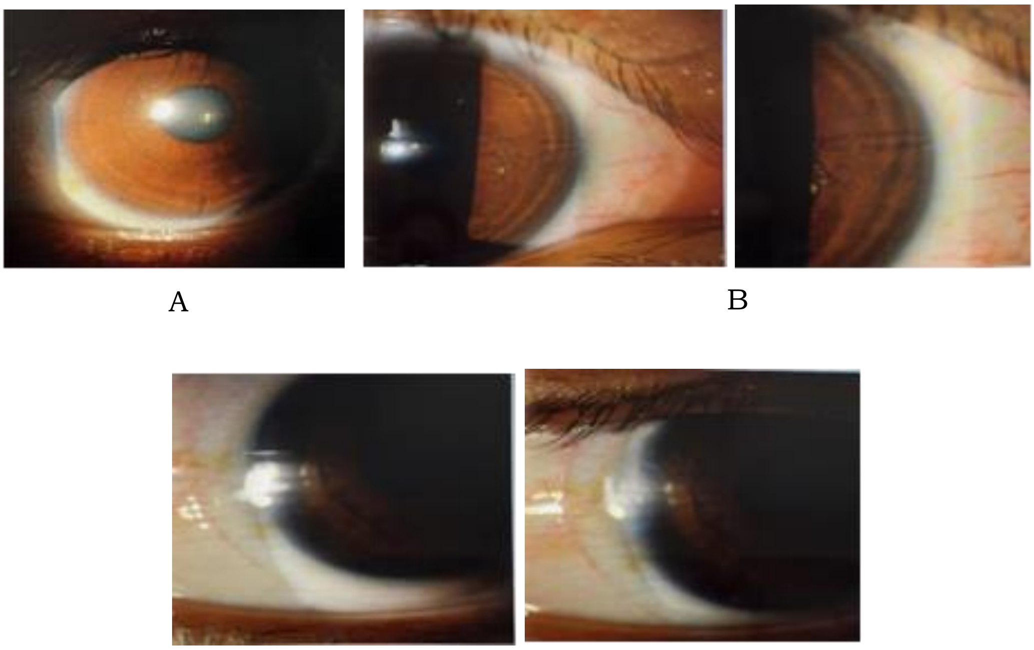



Figure 7. Marker on toric soft contact lenses: A) Initial position before the patient blinks, visible markers at 6 o'clock and 9 o'clock; B) Right eye, the 3 o'clock marker appeared to be shifted clockwise before and after blinking); C) Marker at 3 o'clock of the left eye appeared to be malrotated counterclockwise (before and after blinking).

In this patient, the axis of the toric contact lens trial also did not match the refractive error in the patient's eye. The power of toric contact lenses was in accordance with the vertex distance (VD) conversion calculations in Table 1, i.e., S-7.00 and C-1.50 were converted to S-6.50 and C-1.25, thus, BCVA calculation could not be performed. The patient could be prescribed toric contact lenses based on VD calculations with the axis that had been obtained by fitting on toric contact lens trials, with the OD Power of S-6.50, axis C-1.25(20), best curve (BC) of 8.7, diameter 14.5 mm. On OS, the power was S-6.50, axis C-1.25(150), best curve of 8.7, and a diameter of 14.5 mm.

**3. Discussion**

In this paper, we report 3 cases of patients using toric soft contact lenses with a history of nearsightedness and astigmatism. Astigmatism is an eye refraction disorder which is characterized by various degrees of refraction in various meridians, thus the parallel rays coming into the eye are not focused on one point. Eyes that experience astigmatism will produce an image with multiple focal points or lines. The aetiology of astigmatism is based on structure, i.e. corneal and lenticular astigmatism. The degree of astigmatism is divided by 3, mild if $<0.75$ D, moderate at 0.75 D to 1.50 D, and severe if $\geq 1.50$ D.[5,6,7]

There are 2 types of astigmatism, i.e. regular astigmatism and irregular astigmatism. Regular astigmatism is when each eye meridian has a focal point that is regularly located. In irregular astigmatism, there are differences in refraction that are not regular on each meridian. In this situation, there are multiple meridians that are not perpendicular to each other. [7] According to the location of vertical and horizontal points on the retina, regular astigmatism can be divided into five types, i.e. simple myopic astigmatism, compound myopic astigmatism, simple hypermetropic astigmatism, compound hypermetropic astigmatism, and mixed astigmatism. When viewed from the location of the strongest refractive power, the form of regular astigmatism is divided into three, i.e. With-the-rule (WTR) astigmatism which is when the vertical meridian has a stronger curvature than the horizontal meridian and Against-the-rule (ATR) astigmatism in which the horizontal meridians have a stronger curvature than the vertical meridians. Oblique astigmatism occurs when the main meridian is not on a vertical or horizontal line but has a deviation of 45° and 135°. The angle formed can also be in the same direction, for example, 30° in both eyes, or complementary, i.e. 150° in the left eye and 30° in the right eye.[6,7,8]

The three cases in this case report were classified as regular, moderate astigmatism with a strength of 1.25 D and 1.50 D with compound myopic astigmatism type. Astigmatism was based on the location of the strongest refractive power, the first case was with-the-rule astigmatism and oblique astigmatism in the second, and third cases.

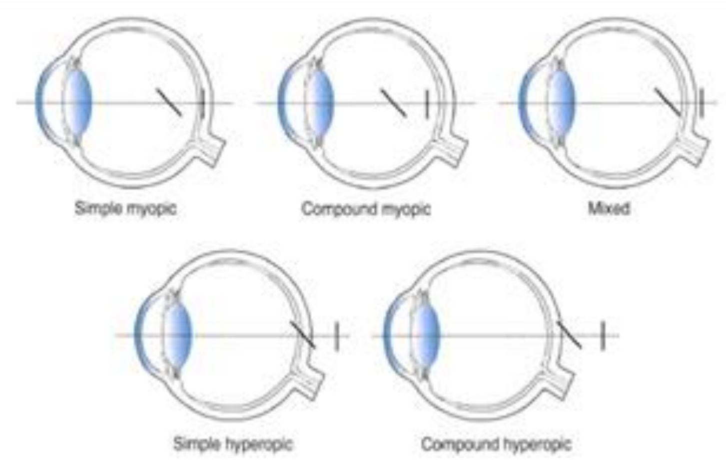



Figure 8. Regular type of astigmatism.[7]

Correction of astigmatism can be done by giving glasses, contact lenses, or refractive surgery. Contact lenses are lenses with a polymer material placed on the cornea to correct visual disturbances, including astigmatism.[4,5] Based on the optical surface, contact lenses are divided into spherical and toric contact lenses. Toric contact lenses have a toroidal surface with two different curvatures on the surface, where one meridian is flatter than the other. Toric contact lenses can provide better correction in eyes with a greater degree of astigmatism.[7,9,10] The selection of toric soft contact lenses is based on several indications, such as the degree of astigmatism, ocular dominance, cylinder axis, and the visual needs of the patient.[4,5] Based on the axis, patients with oblique astigmatism need more correction than those with ATR or WTR astigmatism of the same degree. Factors in the patient's visual needs also play roles, such as the patient's occupation.[5,11]

The strength of toric soft contact lenses depends on the optical design of the lens surface. Soft toric contact lenses will adhere completely to and conform to the shape of the eye. This causes the use of toric soft contact lenses to ignore the presence of a tear lens, thus the calculation of astigmatism correction is based on the Back Vertex Power (BVP) of toric soft contact lenses (Table 1).[10,12] The first case had an axis that matched the available toric contact lens trials, but in the second case, the patient had a different axis but the refractive power was suitable. In the third case, the refractive power experienced a difference after being converted in accordance with Table 1.

Toric soft contact lens fittings are based on the markers found in the trial as a basis for determining the axis and ballast to maintain stabilization. Techniques used to prevent rotation of toric soft contact lenses, such as prism ballast, i.e. the addition of material to the lower edge of the lens which adds weight to the lens. This lens design relies on a vertical prism to direct and stabilize the lens.[13] Another technique is fairy ballast which uses eccentric lenticulation and the thinning edge of a superior lens to produce a prism-like rotational stabilization effect. This modification means that the prism is more constrained to the periphery of the lens, thus allowing for the free potential of the optical prism.[14] The third technique, Thin zone, with dynamic stabilization, by creating a thin zone on the top and bottom of the lens, thus the pressure from the eyelids will keep the lens in position. Both eyelids play an active role, unlike the prism-ballast design which involves interaction primarily of the upper eyelid in order to maximize effectiveness by placing a thicker 'stabilization zone' within the lid while minimizing variation in lens thickness under the eyelid.[13,14]

Table 1. Vertex distance (VD) conversion on toric contact lenses.

| Spheres | -0.75 | | -1.00 | | -1.25 | | -1.50 | | -1.75 | | -2.00 | | -2.25 | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Sph. | Cyl. | Sph. | Cyl. | Sph. | Cyl. | Sph. | Cyl. | Sph. | Cyl. | Sph. | Cyl. | Sph. | Cyl. |
| **0.00** | 0.00 | -0.75 | 0.00 | -1.00 | 0.00 | -1.25 | 0.00 | -1.50 | 0.00 | -1.75 | 0.00 | -2.00 | 0.00 | -2.25 |
| **-0.25** | -0.25 | -0.75 | -0.25 | -1.00 | -0.25 | -1.25 | -0.25 | -1.50 | -0.25 | -1.75 | -0.25 | -2.00 | -0.25 | -2.25 |
| **-0.50** | -0.50 | -0.75 | -0.50 | -1.00 | -0.50 | -1.25 | -0.50 | -1.50 | -0.50 | -1.75 | -0.50 | -2.00 | -0.50 | -2.25 |
| **-0.75** | -0.75 | -0.75 | -0.75 | -1.00 | -0.75 | -1.25 | -0.75 | -1.50 | -0.75 | -1.75 | -0.75 | -2.00 | -0.75 | -2.25 |
| **-1.00** | -1.00 | -0.75 | -1.00 | -1.00 | -1.00 | -1.25 | -1.00 | -1.50 | -1.00 | -1.75 | -1.00 | -2.00 | -1.00 | -2.25 |
| **-1.25** | -1.25 | -0.75 | -1.25 | -1.00 | -1.25 | -1.25 | -1.25 | -1.50 | -1.25 | -1.75 | -1.25 | -2.00 | -1.25 | -2.00 |
| **-1.50** | -1.50 | -0.75 | -1.50 | -1.00 | -1.50 | -1.25 | -1.50 | -1.50 | -1.50 | -1.75 | -1.50 | -1.75 | -1.50 | -2.00 |
| **-1.75** | -1.75 | -0.75 | -1.75 | -1.00 | -1.75 | -1.25 | -1.75 | -1.50 | -1.75 | -1.50 | -1.75 | -1.75 | -1.75 | -2.00 |
| **-2.00** | -2.00 | -0.75 | -2.00 | -1.00 | -2.00 | -1.25 | -2.00 | -1.25 | -2.00 | -1.50 | -2.00 | -1.75 | -2.00 | -2.00 |
| **-2.25** | -2.25 | -0.75 | -2.25 | -1.00 | -2.25 | -1.00 | -2.25 | -1.25 | -2.25 | -1.50 | -2.25 | -1.75 | -2.25 | -2.00 |
| **-2.50** | -2.50 | -0.75 | -2.50 | -0.75 | -2.50 | -1.00 | -2.50 | -1.25 | -2.50 | -1.50 | -2.50 | -1.75 | -2.50 | -2.00 |
| **-2.75** | -2.75 | -0.75 | -2.75 | -0.75 | -2.75 | -1.00 | -2.75 | -1.25 | -2.75 | -1.50 | -2.75 | -1.75 | -2.75 | -2.00 |
| **-3.00** | -3.00 | -0.75 | -3.00 | -0.75 | -3.00 | -1.00 | -3.00 | -1.25 | -3.00 | -1.50 | -3.00 | -1.75 | -3.00 | -2.00 |
| **-3.25** | -3.25 | -0.75 | -3.25 | -0.75 | -3.25 | -1.00 | -3.25 | -1.25 | -3.25 | -1.50 | -3.25 | -1.75 | -3.25 | -2.00 |
| **-3.50** | -3.25 | -0.75 | -3.25 | -1.00 | -3.25 | -1.25 | -3.50 | -1.50 | -3.25 | -1.75 | -3.25 | -2.00 | -3.25 | -2.25 |
| **-3.75** | -3.50 | -0.75 | -3.50 | -1.00 | -3.50 | -1.25 | -3.50 | -1.50 | -3.50 | -1.75 | -3.50 | -2.00 | -3.50 | -2.00 |
| **-4.00** | -3.75 | -0.75 | -3.75 | -1.00 | -3.75 | -1.25 | -3.75 | -1.50 | -3.75 | -1.75 | -3.75 | -1.75 | -3.75 | -2.00 |
| **-4.25** | -4.00 | -0.75 | -4.00 | -1.00 | -4.00 | -1.25 | -4.00 | 1.50 | -4.00 | -1.50 | -4.00 | -1.75 | -4.00 | -2.00 |
| **-4.50** | -4.25 | -0.75 | -4.25 | -1.00 | -4.25 | -1.25 | -4.25 | -1.25 | -4.25 | -1.50 | -4.25 | -1.75 | -4.25 | -2.00 |
| **-4.75** | -4.50 | -0.75 | -4.50 | -1.00 | -4.50 | -1.00 | -4.50 | -1.25 | -4.50 | -1.50 | -4.50 | -1.75 | -4.50 | -2.00 |
| **-5.00** | -4.75 | -0.75 | -4.75 | -0.75 | -4.75 | -1.00 | -4.75 | -1.25 | -4.75 | -1.50 | -4.75 | -1.75 | -4.75 | -2.00 |
| **-5.25** | -5.00 | -0.75 | -5.00 | -0.75 | -5.00 | -1.25 | -5.00 | -1.25 | -5.00 | -1.50 | -5.00 | -1.75 | -5.00 | -2.00 |
| **-5.50** | -5.25 | -0.75 | -5.25 | -0.75 | -5.25 | -1.00 | -5.25 | -1.25 | -5.25 | -1.50 | -5.25 | -1.75 | -5.25 | -1.75 |
| **-5.75** | -5.50 | -0.75 | -5.50 | -0.75 | -5.50 | -1.00 | -5.50 | -1.25 | -5.50 | -1.50 | -5.50 | -1.50 | -5.50 | -1.75 |
| **-6.00** | -5.50 | -0.75 | -5.50 | -1.00 | -5.50 | -1.25 | -5.50 | -1.50 | -5.50 | -1.50 | -5.50 | -1.75 | -5.50 | -2.00 |
| **-6.25** | -5.75 | -0.75 | -5.75 | -1.00 | -5.75 | -1.25 | -5.75 | -1.25 | -5.75 | -1.50 | -5.75 | -1.75 | -5.75 | -2.00 |
| **-6.50** | -6.00 | -0.75 | -6.00 | -1.00 | -6.00 | -1.00 | -6.00 | -1.25 | -6.00 | -1.50 | -6.00 | -1.75 | -6.00 | -2.00 |
| **-6.75** | -6.25 | -0.75 | -6.25 | -0.75 | -6.25 | -1.00 | 6.25 | -1.25 | -6.25 | -1.50 | -6.25 | -1.75 | -6.25 | -1.75 |
| **-7.00** | -6.50 | -0.75 | -6.50 | -0.75 | -6.50 | -1.00 | -6.50 | -1.25 | -6.50 | -1.50 | -6.50 | -1.50 | -6.50 | -1.75 |
| **-7.25** | -6.75 | -0.75 | -6.75 | -0.75 | -6.75 | -1.00 | -6.75 | -1.25 | -6.75 | -1.25 | -6.75 | -1.50 | -6.75 | -1.75 |
| **-7.50** | -7.00 | -0.75 | -7.00 | -0.75 | -7.00 | -1.00 | -7.00 | -1.00 | -7.00 | -1.25 | -7.00 | -1.50 | -7.00 | -1.75 |
| **-7.75** | -7.00 | -0.75 | -7.00 | -1.00 | -7.00 | -1.00 | -7.00 | -1.25 | -7.00 | -1.50 | -7.00 | -1.75 | -7.00 | -2.00 |
| **-8.00** | -7.25 | -0.75 | -7.25 | -0.75 | -7.25 | -1.00 | 7.25 | -1.25 | -7.25 | -1.50 | -7.25 | -1.75 | -7.25 | -2.00 |
| **-8.25** | -7.50 | -0.75 | -7.50 | -0.75 | -7.50 | -1.00 | -7.50 | -1.25 | -7.50 | -1.50 | -7.50 | -1.75 | -7.50 | -1.75 |
| **-8.50** | -7.75 | -0.75 | -7.75 | -0.75 | -7.75 | -1.00 | -7.75 | -1.25 | -7.75 | -1.50 | -7.75 | -1.50 | -7.75 | -1.75 |
| **-8.75** | -8.00 | -0.75 | -8.00 | -0.75 | -8.00 | -1.00 | -8.00 | -1.25 | -8.00 | -1.25 | -8.00 | -1.50 | -8.00 | -1.75 |
| **-9.00** | -8.00 | -0.75 | -8.00 | -1.00 | -8.00 | -1.25 | -8.00 | -1.25 | -8.00 | -1.50 | -8.00 | -1.75 | -8.00 | -2.00 |
| **-9.25** | -8.25 | -0.75 | -8.25 | -1.00 | -8.25 | -1.00 | -8.25 | -1.25 | -8.25 | -1.50 | -8.25 | -1.75 | -8.25 | -1.75 |
| **-9.50** | -8.50 | -0.75 | -8.50 | -0.75 | -8.50 | -1.00 | -8.50 | -1.25 | -8.50 | -1.50 | -8.50 | -1.50 | -8.50 | -1.75 |
| **-9.75** | -8.75 | -0.75 | -8.75 | -0.75 | -8.75 | -1.00 | -8.75 | 1.25 | -8.75 | -1.25 | -8.75 | -1.50 | -8.75 | -1.75 |
| **-10.00** | -9.00 | -0.75 | -9.00 | -0.75 | -9.00 | -1.00 | -9.00 | -1.00 | -9.00 | -1.25 | -9.00 | -1.50 | -9.00 | -1.75 |
| **-10.25** | -9.25 | -0.50 | -9.25 | -0.75 | -9.25 | -0.75 | -9.25 | -1.00 | -9.25 | -1.25 | -9.25 | -1.50 | -9.25 | -1.50 |
| **-10.50** | -9.25 | -0.75 | -9.25 | -0.75 | -9.25 | -1.00 | -9.25 | -1.25 | -9.25 | -1.50 | -9.25 | -1.50 | -9.25 | -1.75 |
| **-10.75** | -9.50 | -0.50 | -9.50 | -0.75 | -9.50 | -1.00 | -9.50 | -1.25 | -9.50 | -1.25 | -9.50 | -1.50 | -9.50 | -1.75 |
| **-11.00** | -9.75 | -0.50 | -9.75 | -0.75 | -9.75 | -1.00 | -9.75 | -1.00 | -9.75 | -1.25 | -9.75 | -1.50 | -9.75 | -1.75 |
| **-11.25** | -10.00 | -0.50 | -10.00 | -0.75 | -10.00 | -0.75 | -10.00 | -1.00 | -10.00 | -1.25 | -10.00 | -1.50 | -10.00 | -1.50 |
| **-11.50** | -10.00 | -0.75 | -10.00 | -0.75 | -10.00 | -1.00 | -10.00 | -1.25 | -10.00 | -1.50 | -10.00 | -1.50 | -10.00 | -1.75 |

Another technique is Prism ballast, 2 thick zones only, this design has thicker points at 8 and 4 o'clock. This can minimize interaction with the lower eyelid, thus it can make it more comfortable to use. In addition, it can maximize oxygen transmission in the 6 o'clock direction. This position can maintain contact lens stability, prevent rotation and allow better adjustment.[14]

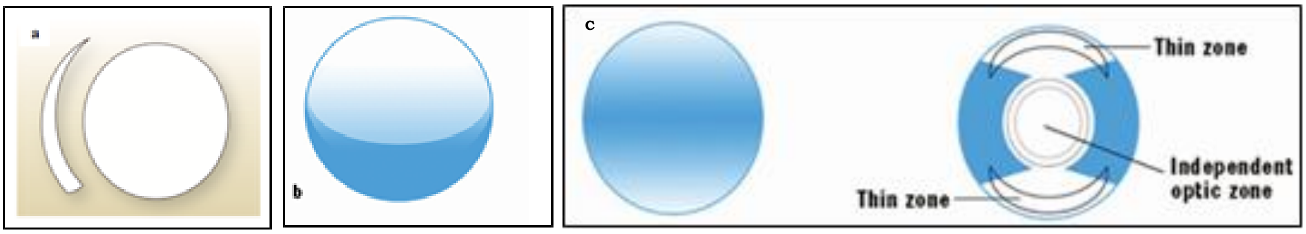



Figure 9. Toric soft lens stabilization technique. a) Prism ballast lenses b) Peri ballast lenses c) Thin zone lenses.[14]

The method of fitting toric soft contact lenses is to perform refraction in a minus cylindrical shape, then perform keratometry. After that, determine total astigmatism, which is the sum of corneal astigmatism and lenticular astigmatism. After that, determine total astigmatism which is the sum of corneal astigmatism and lenticular astigmatism. Choose a trial lens with a base curve according to the results of the keratometry, and a diameter according to the Horizontal Visible Iris Diameter (HVID), then choose the cylindrical axis that is closest to the refraction result. If the minus cylinder is close to 180º, then choose a trial lens with an axis of 180o, and vice versa.[4,6,9]. Toric contact lenses have markings, at 6 o'clock, 3 and 9 o'clock, or another direction. The direction of this marker does not show the axis, but the lens installation position. The marker must fit in position when evaluated on a slit lamp examination. Mark shift of toric soft contact lenses can cause patient discomfort. Measurement of lens rotation using the LARS principle (Left Add, Right Subtract) or the CAAS principle (Clockwise Add, Anticlockwise Subtract).[1,4,6]

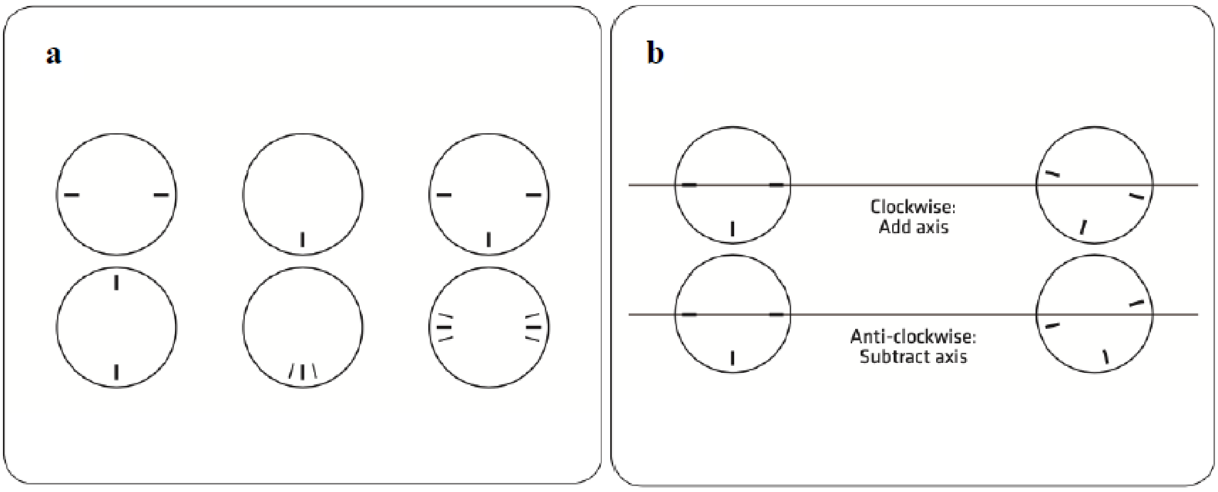



Figure 10. A) Marker on toric soft contact lenses; B) Method of evaluation of lens malrotation.


Figure 11. Evaluation of lens rotation using the LARS method.

The refraction results are made in a cross-cylinder and compensated with a back vertex and then rewrite the spherrocylindrical shape. The final result is written as base curve, strength and axis, diameter, and type of contact lens. The parameters that fit the toric soft contact lens are that the lens must be properly attached to the flashlight part of the cornea, the movement of the lens is not more than 1.5 mm, the lens axis rotation is not more than $15^{o}$, the visual acuity remains stable/normal both before, during, and after flashing. Contact lenses, especially toric lenses, are very important because they can determine the accuracy of the astigmatism axis.[4,6,9]

In the first case, toric soft contact lens fitting was performed using a trial toric soft contact lens with the size of S-0.75 C-1.25(180) in both eyes. The results of the toric soft contact lens fitting showed that the axis markers at 6 o'clock, 3 o'clock and 9 o'clock remained stable, even though the patient had blinked. This showed that the axis of the toric soft contact lens trial was correct. In the second case, toric soft contact lens fitting was performed using a trial toric soft contact lens with the size of S-1.25 C-1.25(180) in both eyes. The size of refractive error required by the patient was S-1.25 C-1.50 (10) on the right eye and S-1.50 C-1.25 (170) on the left eye. The results of fitting the right eye showed that the marker at 9 o'clock and 3 o'clock had shifted clockwise for about 1 minutes or $6^{o}$ or can be given $10^{o}$. A shift of 5 minutes was interpreted as having an axis magnitude of $30^{o}$. The axis calculation using the CAAS and LARS methods was clockwise, thus the axis $180^{0}$ + $10^{0}$ was obtained, which was $10^{0}$. However, in the left eye at the 6 o'clock marker, it was seen that it had shifted anticlockwise by 1 minute or $10^{0}$, and calculations using the CAAS and LARS methods obtained an axis of $180^{0}$-$10^{0}$, i.e. $170^{0}$. In the third case, toric soft contact lens fitting was performed using a trial toric soft contact lens with a size of S-6.50 C-1.25(180) in both eyes. The size of the refractive error required by the patient to wear glasses for the right eye was S-7.00 C-1.50 (20) and for the left eye was S-7.00 C-1.5 (170), but when converted in accordance with table 1, the contact lens power required was S-6.50 and C-1.25. The axis of the toric contact lens was determined using the marker listed on the toric soft contact lens trial. The results of fitting the right eye showed that the 3 o'clock marker appeared to have shifted after blinking clockwise for about 3 minutes or $18^{o}$ or can be given $20^{o}$, thus the axis calculation used the CAAS and LARS methods showed $180^{0}$+$20^{0}$, i.e. $20^{0}$. However, in the left eye at the 9 o'clock and 3 o'clock marker, it was seen that it had shifted anticlockwise by 5 minute or $30^{0}$, and calculations using the CAAS and LARS methods obtained an axis of $180^{0}$-$30^{0}$, i.e. $150^{0}$.

The use of toric contact lenses can provide good long-term vision results which are influenced by many factors, i.e. toric contact lenses have relatively stable lenses, can maintain tear film stability, have optimal moisture, and do not easily cause deposits, which in turn, can be worn comfortably by the patient in various daily activities and in accordance with the patient's lifestyle, because the patient does not need to worry about long-term use and the toric contact lenses do not need to be removed when the patient is changing activities.

## 4. Conclusion

Correction of astigmatism can be done by giving glasses, contact lenses, or refractive surgery. Toric contact lenses have a toroidal surface with two different curvatures on the surface, where one meridian is flatter than the other. Toric contact lenses can provide better correction in eyes with a greater degree of astigmatism. In the first case, it was found that the axis for toric soft contact lenses was in accordance with the available toric soft contact lens trials, thus the same prescription could be given to the patient and when BCVA was performed, refractive correction using contact lenses was obtained to be 20/20. In the second and third cases, the axis of the toric soft contact lens did not match the available trials, thus it was necessary to order the size of the toric contact lens according to the astigmatism disorder in the patient's eye. The calculation of refractive power for contact lenses is different from the use of glasses, thus conversion is required taking into account the vertex distance (VD).

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