Surgery Guidance(白内障手術補助装置)の使用結果について

EVALUATION OF EYE POSITION REGISTRATION SYSTEM BY SMI SURGERY GUIDANCE

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Introduction:

There are several methods for aligning the toric IOL at the intended axis. However, most methods follow a 3-step procedure. First, the horizontal axis of the eye is marked pre-operatively with the patient sitting upright to correct for cyclotorsion. This is usually done using a reference marker or a slit lamp with a rotating slit. Next, intraoperatively, the desired alignment axis for the toric IOL is marked with an angular graduation instrument. Finally, the toric IOL is implanted and rotated until the IOL markings agree with the alignment marks. The SG5000 is a machine which measures keratic astigmatism and registers axis of the eye while also showing the surgeon the overlayed image of the axis through a microscope simultaneously. We started to use this machine one year ago. In one case, just after surgery we began to notice a large dislocation from the appropriate axis. We speculated this was caused by machine registration error, leading us to begin this research.

Purpose:

To evaluate whether or not there are discrepancies between the RU(Reference Unit) images before surgery and the SP(Surgical Pilot) images in the surgery room on the axial registration system.

Methods:

Before cataract surgery, 44 eyes were examined. Reference points were marked, followed by the taking of RU and SP pictures using the SMI SG5000 Surgery Guidance system. Changes in the RU and SP positions were evaluated.

SG5000 Components

This machine consists of three components: The reference Unit(RU), The Surgery Pilot(SP) and the Microscope Integrated Display(MID). The RU measures the severity of the keratic astigmatism and registers the position of the axis. The SP displays the registered axis position overlayed on the surface of the eye during surgery. The MIDshows the surgeon the overlayed image of the axis through a microscope.

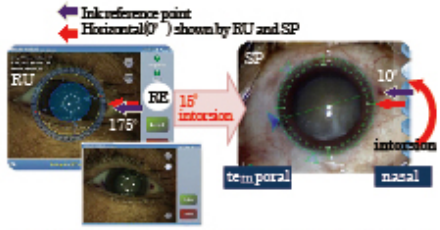
Discussion

① We wonder if these discrepancies are found only on our machine here in our office. Or if other machines are experiencing the same problems.

② We also wonder if the cause of the discrepancies might be thinning of blood vessels which makes registration difficult.

③ The direction of the torsional error depends on the eye. The right eye discrepancy tends to move to intorsion. The left eye discrepancy tends to move to extorsion. The patient's head may be moving towards the opposite side during surgery, which might be causing this.

④ Unpublished data by Fukuoka (Table1) showed no significant difference of axial errors among, non marking, marking and SG5000 after implantation of toric IOL. This may be partially due to the registration error of SG5000 .



The 0° shown by SP and the 0° shown by RU are not in the same place. In this case, the size of the discrepancy is 15° in the intorsion direction.

Results

①Differences of the 2 positions were less than 1° in 39%(17/44) of the subjects. Remaining 61% (27/44) showed larger discrepancies. Average differences were 15° ±6° (5° to 25°).

②The direction of the torsional error depends on the eye. The right eye discrepancy tends to move to intorsion, while the left eye discrepancy tends to move to extorsion.

Comparison of axial error found after implantation of toric IOL

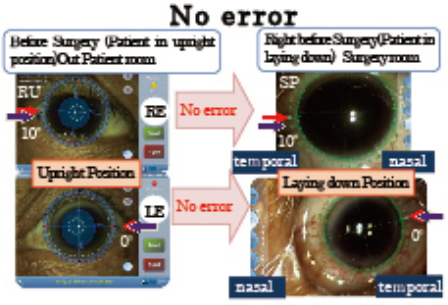
	Non Marking	Marking	SG5000
method	non	Photograph Marking	SG5000
	7.5±7.9(n=13)	8.4±7.1(n=24)	5.5±3.3(n=19)

Axial errors between eye and toric IOL: P=0.43, P=0.32, P=0.54 Not significant

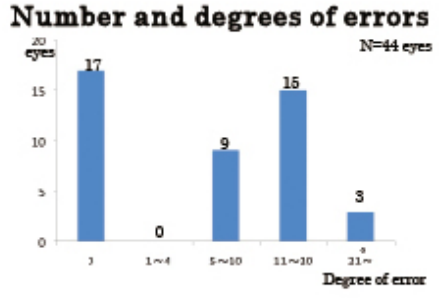
Table1

※ Unpublished data by Sachiko Fukuoka

No error



Number and degrees of errors

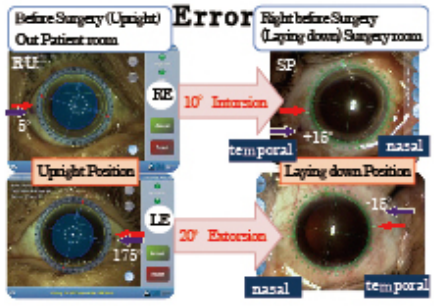


Conclusions

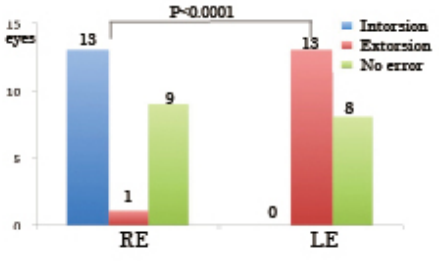
①When using this system for implanting toric intraocular lenses, 60% of the eyes have possibilities for discrepancies 5° or more. It is hoped that the software will improve in the future.

②At the present time, it is necessary when using this machine to mark reference points before surgery in order to notice possible errors.

Error



Number and direction of errors



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