

Binocular Indirect Fundus Microscope in Vitreoretinal Surgery

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With the rapid development of computer technology, the application of computer technology in various fields is more and more common, and it also plays an increasingly important role in biomedicine. In recent years, microscopic image processing has always been an important part of biomedicine, and binocular indirect fundus microscope is playing an increasingly important role in vitreoretinal surgery. The purpose of this paper is to study the application effect of binocular indirect fundus microscope in vitreoretinal surgery, and to master the role of binocular indirect fundus microscope, which is important for biomedicine. This paper studies the effect of binocular indirect fundus microscope in vitreoretinal surgery through the study of the role of vitreous and binocular indirect fundus microscope, as well as the investigation of experimental methods. It highlights that the effect of binocular indirect fundus microscope is better than that of direct microscope in retinal surgery. The results show that binocular indirect fundus microscope is more suitable for vitreoretinal surgery. 85% of the patients with vitreoretinal surgery have better effect after surgery. No matter from the comparison of visual acuity improvement or retinal thickness, binocular indirect fundus microscope has better effect in vitreoretinal surgery. It also provides reference for how to prevent vitreoretinal diseases disease has positive significance. We expect to produce effective methods as soon as possible to solve the problems related to vitreous diseases, which can bring the bright future to ophthalmic patients.

Keywords: Binocular Indirect Fundus Microscope, Vitrectomy, Retinal Surgery, Application Effect

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With the improvement of life quality and medical level, because information is directly accepted by people, most of the information is accepted by people with real information, which is more intuitive and easier to accept with real information. So the role of the eye is visible. As he said, the eyes of the soul are the windows, which mean that people can understand the inner world through the eyes, and people's emotions can be expressed through the eyes. Someone with the more and more important role of retinal examination in medical diagnosis, fundus retinal imaging technology is also improving. Fundus retina is the only capillary tissue that can be directly observed, so people have been committed to the research of fundus detection instrument.

In recent years, people have invested a lot of manpower in the study of the surrounding area of the

fundus. The peripheral fundus structure is a circular region with a width of about 9 mm. It is composed of the anterior border serrated edge and the posterior border vortex vein into the sclera. The serrated margin is similar to serration, and the size and shape of the protruding and concave parts are irregular. The capillaries on the retina are relatively thin in the serrated edge area, so it is relatively difficult to obtain the image. Mutations often occur in the retina around the fundus due to some diseases, such as infant retinal mutations, cataract, diabetes and so on. These vascular mutations often occur in the early stage of the disease, so it has important reference significance for early diagnosis.

Filipe NL considered that the results of ophthalmic examination were better than those of literature. Our study found that the prevalence of posterior segment defects in ophthalmology is

Binocular Indirect Fundus Microscope in Vitreoretinal Surgery similar to that in the previous literature. These findings are not related to inflammatory bowel disease, but not related to it. The most common and not previously reported finding is the increase of small artery tortuosity, which may be caused by systemic vascular injury in inflammatory bowel disease, but there is no actual data support, and the theory is not perfect¹. Rahimi esboei B believes that objective to describe the use of polymerase chain reaction in peripheral blood and prove its importance in the clinical follow-up of patients with ocular toxoplasmosis. The binocular visual field test conducted by GP is similar to the right half visual field defect of the right eye, which is inconsistent with the visual field loss caused by organic diseases. Based on these results, we diagnosed the case as right eye functional visual impairment. In patients with unilateral temporal hemianopia, we must distinguish functional visual loss from organic diseases, and we found that the comparison between unilateral and binocular visual field can be used for auxiliary diagnosis, but there are still many practical problems that need to be improved². Goto K believes that we have reported patients with unilateral functional temporal hemianopia whose binocular visual field test can be used for differential diagnosis. GP was used to detect right eye meridian along temporal hemianopia and left eye normal visual field. Optical coherence tomography or multifocal electroretinogram showed no abnormality related to temporal hemianopia in the right eye, and the experiment was not complete³.

The innovation of this paper is to use the experimental investigation and comparison method, using specific data to highlight the better effect of binocular indirect fundus microscope in vitreoretinal surgery, to observe the effect of binocular indirect fundus microscope on vitreoretinal function and to explore the way to avoid retinal damage, which provides an important basis for the timing and evaluation of clinical authenticity test basis.

VITREORETINAL SURGERY

Introduction of Vitreous

Vitreous body vitreous body vitreous body is characterized by its inherent gel properties, complex and changeable biomechanical properties and the

effect of vitreous body surgery after vitrectomy. In the early stage, it was thought that the vitreous was a simple structure with high water content, and the cortex contained a very small number of cells, which could be completely removed without affecting the eye function. However, with the improvement of ophthalmology technology and concept, the function of vitreous was paid more and more attention, and the traditional research methods were quite limited, which aroused researchers' strong doubt and interest in vitreous. Vitreous hemorrhage is blood infiltration into the eye internal interference is a common complication of normal vision. In practice, considering the primary disease and late complications, early active treatment is recommended. Upgrading the state-of-the-art official equipment and skilled intraocular surgery techniques, especially increasing the minimum number of neutrophils and using anti VEGF drugs before surgery, greatly reduce the risk of surgery and the number of complications after surgery. However, there are still many problems to be solved, such as the mechanism of action of vitreous body on retina and other ocular tissues, the prevention of fibrous proliferative membrane after vitreous hemorrhage, the selection and evaluation of intervention time window for vitrectomy, and the study of ideal intraocular filler.

Fundus Imaging Technology

Because the human eye plays a key role in the early screening of many diseases, the fundus image acquisition technology has been developed unprecedentedly. For different diseases, there are different ophthalmic instruments, but there are many common principles. Fundus testing instruments are divided into functional testing instruments and morphological testing instruments. This paper mainly uses the first morphological detection instrument, which includes common diagnostic equipment, such as ophthalmoscope, slit lamp, etc.; two-dimensional fundus image acquisition equipment includes fundus camera, fundus fluorescein angiography, etc.; three-dimensional image acquisition equipment, such as laser scanner, polarization laser scanner, continuous density analyzer, imaging equipment, optical integrated tomography and so on. The field of view

Binocular Indirect Fundus Microscope in Vitreoretinal Surgery angle of indirect ophthalmoscope is relatively large, which can reach 60 degrees.

Fundus Microscope Camera

With the development of optical technology and the continuous improvement of technology, the performance of fundus camera is more and more superior, the imaging field angle is larger and larger, and the resolution is higher and higher. The traditional fundus camera has a simple structure, but its imaging field is small. It needs to shoot from multiple angles. Its function is relatively simple, and it generally needs mydriasis processing⁴⁻⁵. Therefore, the early fundus camera can do relatively less examination content, and can not be applied in the early diagnosis of eye diseases such as ROP. Fundus image preprocessing is to improve the image quality and the effect of subsequent image processing through image preprocessing⁶⁻⁷. It usually includes image improvement, image reconstruction, and image segmentation and so on. Its main purpose is to reduce the influence of noise and highlight image features. This paper only introduces the same preprocessing method in fundus image processing. Because of individual differences or different acceptance conditions, fundus images will be different. In processing, we can choose the appropriate processing method according to the needs⁸⁻⁹.

VITREORETINAL SURGERY RELATED EXPERIMENTS

Aberrations of Human Eyes

Although the human eye has a high ability of self-regulation and environmental adaptation, it inevitably has a variety of aberrations like other optical systems, the most typical of which are myopia, hyperopia and astigmatism¹⁰⁻¹¹. The human eye is not a rotationally symmetric structure, and there is a certain deviation between the optic axis and the optic axis. The retinal fovea is not in the center of the optic axis, but a little lower. According to the wave principle of light, the human eye imaging deviation is also called wavefront aberration, It is normal for human eyes to have aberrations¹²⁻¹³. Generally, the low-order aberrations produced by cornea and the high-order aberrations produced by lens will compensate each other, so as to reduce the

overall aberration, but there is also the case of aberration superposition. In the process of retinal imaging, the increase of the field of view of fundus image will greatly increase the aberration, mainly reflected in the field curvature and distortion¹⁴⁻¹⁵.

Establishment of Human Eye Model

In the design process of human retinal imaging system, optical software should be used to simulate and optimize the optical path¹⁶⁻¹⁷. How should I live In the process, we need to establish the optical model of human eye. For human eye model, every layer of medium from cornea to retina belongs to the component of the optical system. Although each human eye is different, many characteristics are similar. The refractive index, surface reflectance and curvature of each surface are relatively close. The optical eye model is to obtain the optical constants of each tissue according to a large number of actual detection results. In the past, the concept of refraction in the human eye model only studied the characteristics of paraxial optics, which can not simulate the real characteristics of the human eye in the process of wide area imaging. Model eye established a wide-angle optical model eye for analyzing the peripheral region of human retina¹⁸⁻¹⁹.

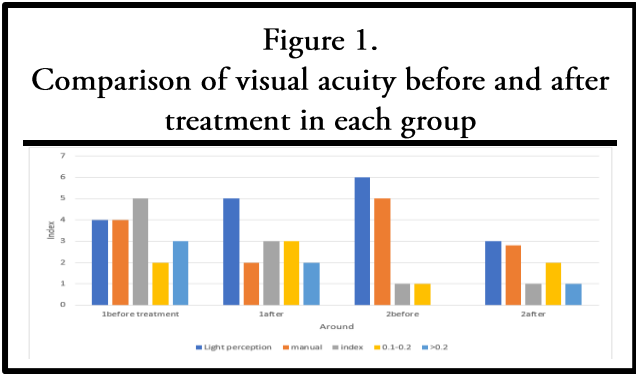
Investigation Experiment Method

In this study, 60 patients who underwent retinal surgery in the optometry center of ophthalmic hospital were randomly selected as the research objects, In addition to the routine preoperative studies, including UCVA, BCVA optometry, slit lamp screening, corneal topography, tear secretion index, through the screening of fundus and fundus photos, the data of macular retinal density and density were collected. Three days before the operation, most of the patients underwent 6 times / day ophthalmic examination to clean the connection bag and stabilize the source scanning. Some patients can make some small adjustments according to the specific situation.

EFFECT OF VITREORETINAL SURGERY

Comparison between Direct and Indirect Microscopy

This study used retinal surgery to evaluate the recovery of patients. In the direct and indirect



aggravating case. In the endoscopic group, 40 cases were effective and 2 cases were ineffective; in the microscope group, 55 cases were effective and 5 cases were ineffective, and there was no significant difference between the two groups, as shown in Table 1.

It can be seen from chart 1 that the recovery of patients with retina after surgery. There was no obvious aggravation in the direct microscope group and the indirect microscope group. All patients in the two groups underwent closed three channel 23g vitrectomy through pars plana. All operations were performed in the operating room according to the requirements of aseptic surgery. The patient was placed in the supine position. After local anesthesia with chloroform eye drops, normal saline bag was washed with iodine disinfectant, sterile towel was distributed for routine disinfection, and normal saline bag was washed again with lidocaine and vaccine mixture after bullet plugging. In order to remove the vitreous body, a small 23g vitrectomy incision was made on the cylinder plane. According to the operation conditions, retinotomy, retinotomy, proliferative membrane resection, retinal laser photocoagulation, gas-liquid exchange, etc. For the patients with iatrogenic hole or preoperative traction hole and traction retinal detachment, silicone oil should be injected for long-term top pressure, and the patients with silicone oil should take face down position after operation. Levofloxacin, propranolol and TobraDex eye drops were used to prevent infection and reduce inflammation. The postoperative visual acuity is shown in Figure 1:

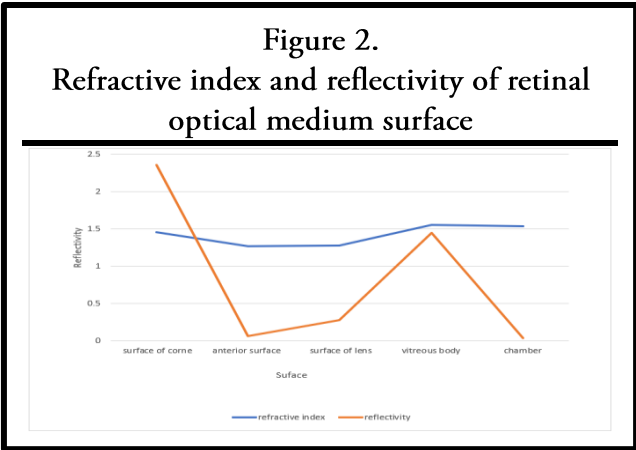


Table 1.
Comparison of different therapeutic effects between the two groups

	In Endoscopy Group	In the microscope group	Total
effective	40	50	90
invalid	3	6	9
total	41	46	87
effective	92.21	78.87	92.34

As shown in Figure 1, the visual acuity of 3 eyes in group 1 was corrected (20%), the average visual acuity before operation was manual, the average visual acuity after operation was index, and the visual acuity of 7 eyes in group 2 was corrected (100%). The average visual acuity was 0.15. In the second group, the visual acuity was corrected from the initial index / 15cm to 0.8 at the latest, and 0.1 at the latest after completion. The skin and subcutaneous tissue grid had a certain tolerance to fluctuations, and the intraocular pressure was too high, but the excessive intraocular pressure or negative pressure suction time exceeded the tissue tolerance of the retina, causing damage to the retina and RNFL, or even irreversible damage. Because of the lack of comparative study on the effect of different sucking time on retinal tissue, mastering the operation technology and sucking time is conducive to protecting the retina after operation.

Human Eyes after Retinal Surgery

As a part of the fund imaging system, the human eye must take the characteristics of the human eye as the illumination and composition when designing the fund instrument.Basis of optical design. The two key points of fundus retina acquisition are fundus illumination and fundus reflection image capture.

The human eye is equivalent to a dark room, and the only way to transmit light is through the pupil and human eye tissue medium to shoot light into the fundus of the eye. In this process, the light beam is reflected and refracted through the surface of the cornea, pupil, etc. and absorbed by the retina, so that it can finally be reflected, there was very little light coming. And considering the safe use of light, can not produce side effects on the human eye, so it is necessary to control the human eye tissue. In order to reduce the stray light, ghost image and improve the light transmittance, the lighting and imaging optical path should be designed reasonably. Human eye the transmittance and surface reflectance of each tissue are the main factors affecting the beam as shown in Figure 2:

The use of indirect fundus microscope makes the clinical trials of retinal surgery more common. The visual observation of corneal morphology in patients with retinal cell level constitutes a new diagnostic method. This study uses indirect fundus microscope to observe the corneal morphology of patients with dry eye, which provides an important clinical basis for further study of corneal pathophysiological changes in patients with retinopathy. According to. But at the same time, the test is also affected by the subjective factors, the positioning test of some parts of the cornea may be biased, so it is repeated for many times.

Retinal Thickness Control

In this study, two groups of patients before and after the operation of macular thickness comparison, we choose the fourth layer of macular thickness of

patients after operation, compared with the preoperative macular thickness. Compared with the preoperative total thickness, the postoperative thickness of the camera group decreased by 4 times, the difference was statistically significant. There was no significant difference in the preoperative lesion thickness between the experimental group and the control group, but the postoperative lesion thickness of the experimental group and the control group decreased by 4%, the difference was statistically significant. As shown in Figure 3:

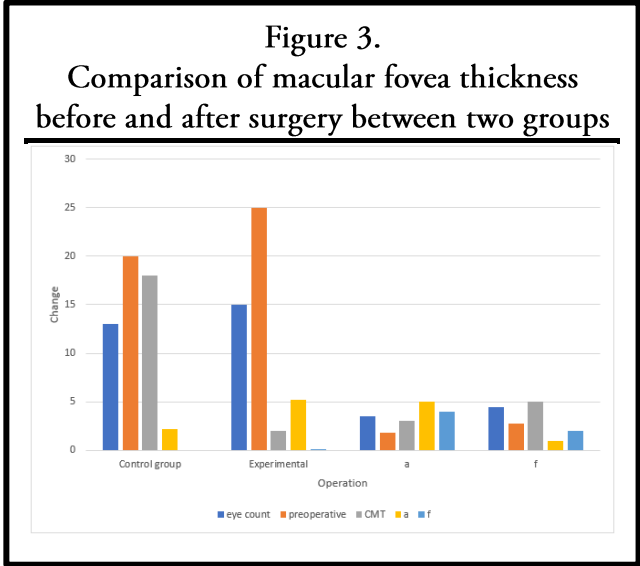
Retinal operating microscope is a kind of photoelectric microscope conversion device specially designed for microscopic imaging. It can convert the image under the microscope into electrical signal and transmit it to the computer in real time through the USB interface. The computer finds out the target cell through the processing and recognition of the real-time image and returns the coordinate value of the cell. The cell coordinate is transmitted to the lower computer through the serial port. The lower computer reads the data and carries out the corresponding processing to drive the stepper motor and control the movement of the stepper motor the

Figure 4.
Binocular indirect fundus microscope
(<http://alturl.com/imhst>)



binocular indirect fundus microscope is shown in Figure 4:

Cell image processing and analysis under



Binocular Indirect Fundus Microscope in Vitreoretinal Surgery microscope is an important branch of medical image processing, and it is also a hot research topic for scholars. Medical image processing, as the name suggests, is the application of image processing technology in medicine. The research results of different scholars are quite different, and mainly focus on the study of the changes of total eye aberration and corneal aberration. There are few researches on the higher-order aberrations of the posterior surface of cornea. This part mainly studies the changes of the higher-order aberrations of the anterior and posterior surface of cornea and the whole eye before and after surgery, hoping to have a deeper understanding of the changes of the higher-order aberrations of various parts after surgery.

CONCLUSIONS

By introducing binocular indirect fundus microscope and experimental investigation and comparison, this paper points out that binocular indirect fundus microscope is more effective in vitreoretinal surgery. In addition to supporting buffer, it can also assist the metabolism of periocular tissues in vitreoretinal surgery, so it is important to maintain the normal structure and physiological function of vitreous, which is of great significance to retina, lens and other ocular tissues significance. It is important to study the effect of binocular indirect fundus microscope in vitreoretinal surgery on retinal function. Vitrectomy should take this as the time window, but at the same time, the etiology, degree, visual function and visual function of vitreous hemorrhage should be considered comprehensively the function of omentum and choroid. These conclusions are helpful to observe the effect of vitreoretinal surgery on retinal function and explore the way to avoid retinal injury, provide important experimental basis for the selection of vitrectomy window and prognosis evaluation, and also have positive significance for the prevention and treatment of vitreoretinal diseases. We expect to produce effective methods as soon as possible to solve the problems related to vitreous diseases, which can give ophthalmic patients a bright future. It can not only help to find the way to protect the retina from damage, but also provide reference for choosing the timing and methods of surgical intervention and evaluating the prognosis recovery.

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