

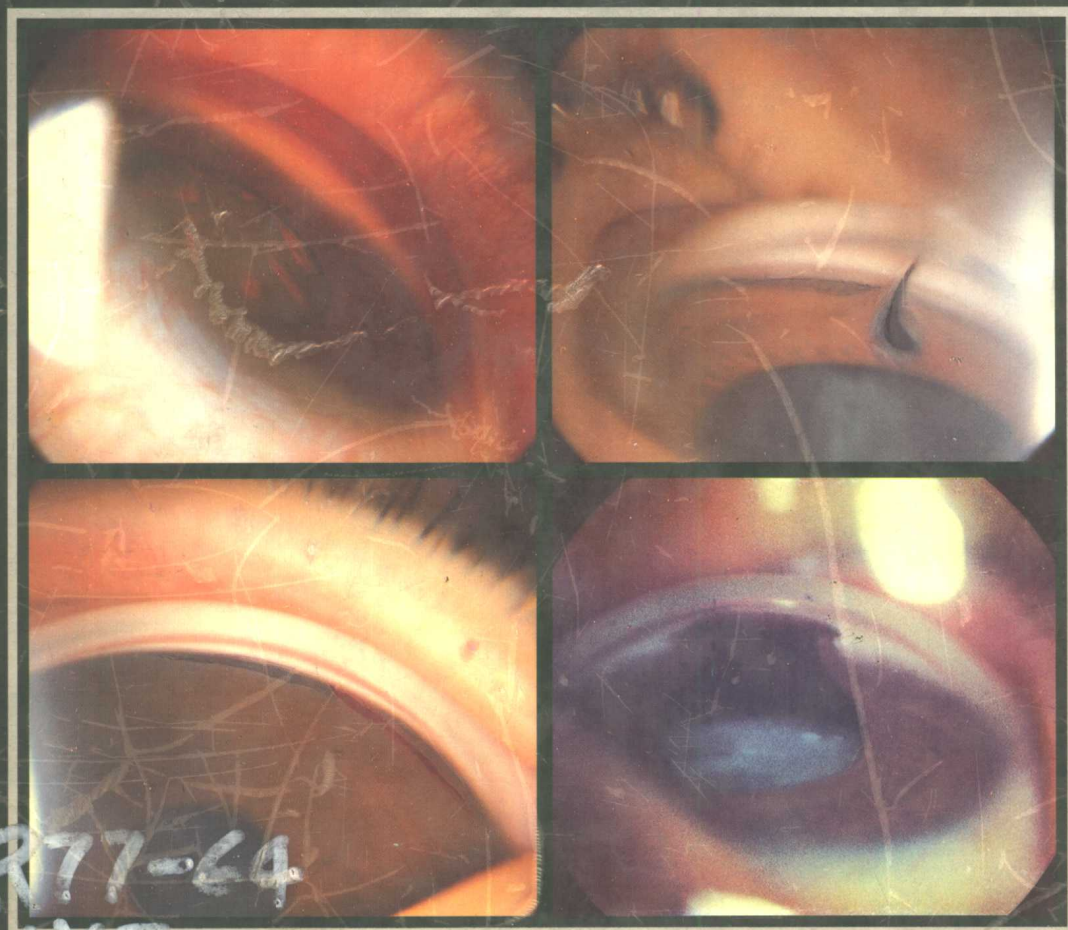


前房角圖譜

ATLAS OF GONIOPHOTOGRAPHS

黃秀貞 主編

吉林科學技術出版社



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前房角图谱

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前言

前房角是角膜缘周围内面的一个夹角。这个部位虽然不大，但其构造微细而精密，对眼睛的生命力起着重要的作用。此部位发育异常或发生病变，往往导致眼睛的失明。故前房角的检查是眼科临床医生必须掌握的常规检查之一。如有的先天性青光眼，房水排泄系统根本没有发育，此时若盲目地进行房角切开术是难以成功的，故应先检查房角情况，然后决定术式才妥。又如青光眼的分型，即开角或闭角，也多依赖前房角检查决定。受挫伤的眼球，大多有房角后退或睫状体剥离等病变，只有进行前房角检查才能发现，以补充临床遗漏的诊断，并注意发生房角后退性青光眼使之及早得到治疗。有些裂隙灯下难以发现的铁锈症，使用瓶式房角镜检查，能清楚地看到角膜的黄色反射，可为临床诊断眼球内铁质异物提供有力的证据。此前房角镜价廉而使用方便，基层医院也可开展。

编者及所在科室早在 1950 年起就在已故张文山教授的指导下开展用 Koeppe 氏前房角镜和手持裂隙灯进行前房角检查。用绘图的方法表达各种前房角的改变，不但耗费时间，而且无论怎样下功夫也不如摄影逼真。1978 年以来，编者利用 Kowa 手持眼底照像机和 Koeppe 氏前房角镜成功地进行房角摄影，而后又用自己改进的瓶式前房角镜进行前房角检查及摄影，取得了较满意的效果。本图谱的前房角，编者除注明使用 Koeppe 氏及 Goldmann 氏房角镜外，其余均为使用瓶式房角镜摄影。从收集的大量宝贵临床资料中，选出 225 幅分为 29 组，包括有正常房角、先天异常与遗传、青光眼、异物、炎症、各种形状的梳状韧带及房角粘连、肝豆状核变性的房角、囊肿、肿物、角膜移植以及人工晶体、激光等新技术新疗法后的房角所见。书中收集有手术成功的例子，也收集了失败的病例。

本图谱有些图片附有组织病理片对照，使初学者更易理解，对于医疗、教学和研究亦有裨益。各图附有说明文字，中英对照。首图为张文山教授生前亲手绘制的前房角及组织解剖对照模式图，以为纪念。本图谱蒙日本东京大学医学部眼科名誉教授三岛济一先生，国内郭秉宽、张晓楼、周文炳等 12 位眼科专家审阅并力荐出版，在此谨致谢忱。

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Preface

The anterior chamber angle is formed in the inner part of corneosclera. Though it is very small, its structure is accurate and complex. The angle is important for eye function. The malformation and dysfunction of this part may cause blindness. So, the examination of anterior chamber angle is an essential routine for clinical ophthalmologists. For example, in certain cases of congenital glaucoma, whose humoral excretory system had not developed at all, to perform a goniotomy in such cases is very venturous and can not be sure of success. Any appropriate operation should be decided after the examination of the anterior chamber angle. The classification of glaucoma is mainly based on the findings of this examination. Recession of chamber angle and separation of ciliary body may be omitted in the diagnosis of bulbar contusion. Only by the examination of anterior chamber angle, can these signs be found. And then, take notice of occurrence of glaucoma for treating it at a right time. Some cases of siderosis are very difficult to be determined under the slit-lamp, but the yellow reflex of cornea can be seen clearly by the use of the gonioscope (bottlestyle). This sign is a forcible evidence for the diagnosis of bulbar siderosis. I began the examination of anterior chamber angle with Koeppé's lens and a portable slit lamp since 1950 under the direction of professor Zhang Wenshan. It is very difficult to record the pathologic changes of the anterior chamber angle with drawing. Since 1978, I made use of Koeppé's lens and Kowa's portable fundus camera to take the pictures of anterior chamber angle with success. A modified gonioscope in bottle-style was used in the examination and photograph, which achieved good results. Most of the pictures of this atlas were taken with this modified apparatus, while a few of noted ones were taken with Koeppé's lens or Goldmann's lens.

225 pictures were selected from our data collecting in the last 6 years. They are divided into following 29 groups: the normal angle, congenital abnormalities, hereditary diseases, glaucoma, cataract, postoperative appearances of both glaucoma and cataract, trauma, siderosis, haemosiderosis, foreign body of the chamber angle, inflammation, adhesions, the hepatolenticular degeneration, cysts, tumours, corneal transplantation, artificial lens implantation, the lesser treatment and other new therapy, etc. Some failed cases were collected in this book as well.

There are some histopathological pictures of certain cases, they are useful for beginner and helpful for clinics, teaching work and investigation. The explanation of each picture is written in both Chinese and English. The picture of anterior chamber angle of the first Figure was drawn by Professor Zhang Wenshan himself when he was living.

This book is checked and recommended to be published by Saiichi Mishima, M. D., Professor Emeritus of Medical College of Tokyo University and 12 famous Chinese ophthalmologists including Zhang Xiaolou, Zhou Wenbing, Guao Binkuan and others. I wish to convey my sincere thanks to them.

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1. 正常前房角

正常前房角的各部形态、颜色各异，不能以简单的语言加以概括。笔者依据大量临床调查资料，对正常前房角的检查，可按下述 9 个方面的顺序进行。在检查前，首先进行一般初诊检查项目，做到有的放矢。

(1) 角膜：①角膜光学切面：透明，中央弧度稍薄于周边；②角膜内面（角膜圆顶）：透明，可透见结膜血管；③角膜缘部：透明，可看见角膜缘血管。

(2) Schwalbe 氏线：是前房角组织的开端，它相当于角膜后弹力层的止端，位于角膜内面移行于巩膜处，在青少年的眼内显示白色且有光泽的线条状环。老年人则多不清楚。笔者所在科室普查过的 500 只正常人眼中，发现 Schwalbe 氏线上的下部均有不同程度的色素沉积点。其连成一条细线者占 99.2%，故下方的房角显得与角膜界限分明，而周围部则不够清楚。由此可见，Schwalbe 氏线多是隆起于前房的脊，其隆起使角膜的向心端形成一浅沟，当色素随房水循环时，因重力的关系而沉积于此，检查时可先看下边则易于识别房角。

(3) 滤帘：紧接 Schwalbe 氏线的下边，呈一条环形带状，此即为组织学上的纤维柱 (Trabecula)，排列成三角形，在角膜内面，实宽约 0.5mm，如用 16 倍前房角镜观察时，宽可达 8mm。滤帘的宽窄可因检查时视线的角度不同而异。儿童滤帘多透明，如不仔细观察，与透明的角膜几乎分不清。随年龄的增长，滤帘变为淡灰黄色，老年人多显得致密，且色素沉积较多。

(4) Schlemm 氏管：位于滤帘的后 2/3 处，呈淡灰色，其内侧即滤帘的功能部分，当 Schlemm 氏管充血或色素沉积时，就可以清楚地看到 Schlemm 氏管呈红色或棕色带状，与下面的巩膜突界限非常清楚。

(5) 巩膜突：在滤帘与睫状体带之间，为一条白色窄带，是滤帘后界的标志，大多数人可以看到，如果其表面有滤帘组织越过，亦可呈浅灰色，如 Schlemm 氏管充血时，其上界则更明显。

(6) 睫状体带：相当睫状体前端，在多数人均可见到。我国人多为褐色或灰褐色，与虹膜颜色容易区别。有些正常人的睫状体带表面似有一层不同深浅的灰褐色薄膜，因其表面有滤帘小梁的延长部遮盖之故。睫状体带的宽窄与房角的宽窄有关，在正常眼其宽窄亦极不一致，检查时如从光线与虹膜平行的角度观察，看不到睫状体带或仅看到较窄的睫状体带，但从另一角度去看，仍可见相当宽的睫状体带，故检查时注意变换角度或使眼球转动位置。睫状体带的前面被延长的虹膜根部网状组织所掩盖，从房角的立体像看来，仍然是敞开宽角，因此，不能认为是窄角或粘连。

(7) 虹膜根：在与睫状体带下缘相接之处，是虹膜最薄弱的地方，当眼球受挫伤时，此处最易离断。

(8) 梳状韧带（虹膜根部突起）：是从虹膜根部发出的细丝状支架，向上伸展可达到巩膜突或滤帘上，颜色与虹膜同，但并非所有的眼均能看到。在我们检查的 500 只正常人眼中，仅

有 231 眼可见，占 46. 2%。

(9) 虹膜末卷：是虹膜外围最周边的一个隆起皱褶，高低不平，末卷高的可使前房角变窄，当患青光眼或虹膜炎时，容易发生房角关闭或粘连。

1. Normal anterior chamber angle

The normal anterior chamber angle varies in shape and colour, so it can not be generalized simply. Bases on the data of 500 normal eyes and a vast amount of clinical observations, nine structures of a normal chamber angle must be examined successively. Certainly, the routine examination of first visit must be taken before the local examination to gain the key points and the conditions of all areas of such case.

(1) Cornea; ①It is transparent in optical section. The thickness of its central portion is slightly thinner than that of the periphery. ②The inner surface of the cornea (i. e. , the dome of cornea) is transparent; the conjunctival vessels can be seen through it. ③The limbus of cornea is transparent too, and some vessels may be seen.

(2) Schwalbe's line; It is the boundary of the structures of the chamber angle and corresponds the end of the posterior elastic lamina of the cornea. It is The place of the inner surface of the cornea continued with the sclera. In adolescents, it gives an appearance of white, lustrous, and striped ring. It is blurred in old people. Pigment-precipitate spots can be seen on the lower portion of the Schwalbe's line. It is found in 99% of the 500 cases of the normal eyes. So that, the demarcation between the chamber angle and the cornea looks much more clear at its lower part than the elsewhere. This shows that the Schwalbe's line is a crest which protrudes into the anterior chamber and forms a shallow furrow toward the center of the cornea. When the pigments circulate in the aqueous humour, they precipitate here by gravity. It is convenient to recognize the chamber angle from its lower part by this pigmented line.

(3) Trabecular meshwork; It lies just below the Schwalbe's line as a circular band. It is called the trabecula histologically and is triangular arranged in the histological sections. It is about 0. 5mm wide, and becomes 8 mm under the gonio-

scope (16 x). The width of trabecular meshwork varies from the different directions of observation. It is usually transparent in childhood and may be confused with the cornea carelessly. This meshwork becomes greyish yellow with years. It usually appears more dense and pigmented in the aged.

(4) Schlemm's canal: It locates at $2/3$ of the trabecular meshwork posteriorly and is grey in colour. Its Medial part is the functional part of the trabecular meshwork. When the Schlemm's canal is congested or deposited with pigment, it is a red or brown coloured band and clearly demarcated with the scleral spur.

(5) Scleral spur: It is a white narrow band between the trabecular meshwork and the ciliary body band. It is the landmark of the posterior boundary of the trabecular meshwork. It can be seen in most cases. When its surface is crossed by the tissue of trabecular meshwork, it may be changed to greyish colour. Its upper margin is more clear when the Schlemm's canal is congested.

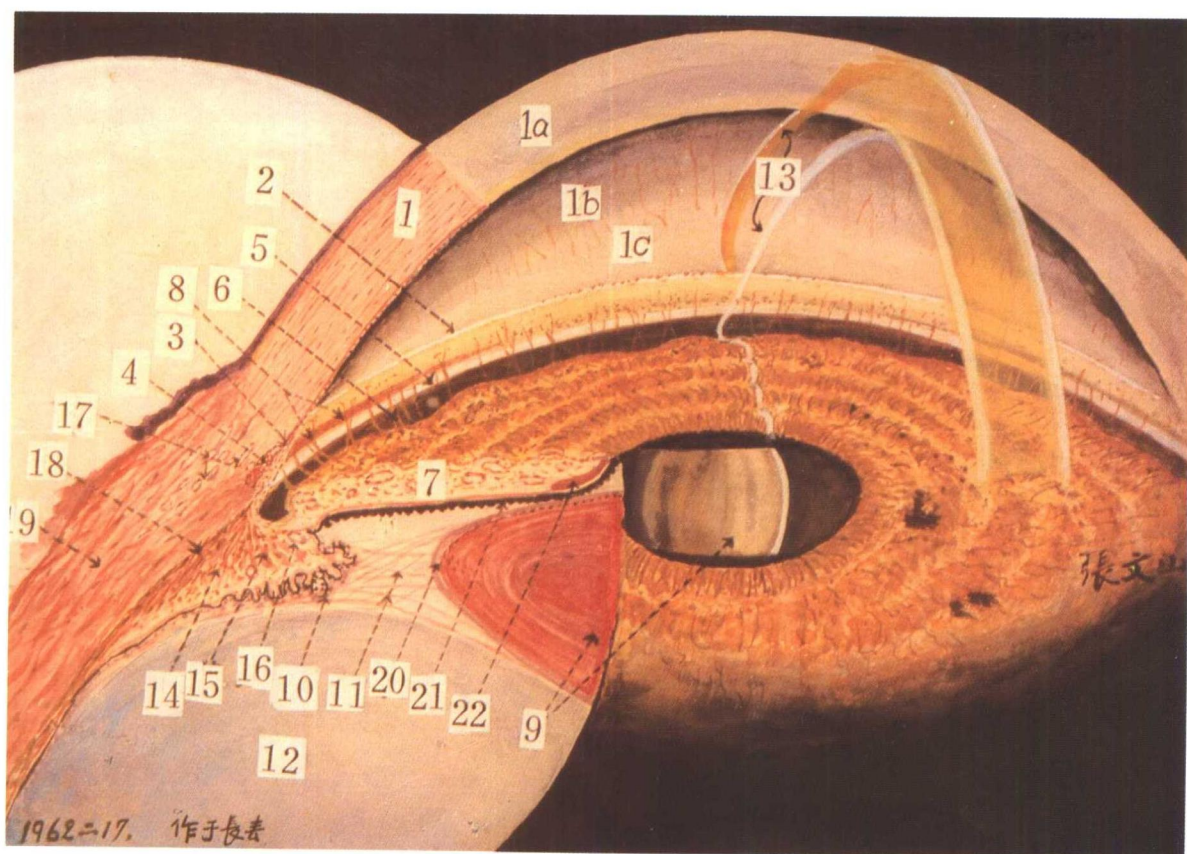
(6) Ciliary body band: It is corresponding to the anterior end of the ciliary body and can be seen in most of cases. It is brown or greyish brown in Chinese and easily distinguished from the colour of the iris. In some cases, there is a thin membrane in various shades of greyish brown colour on the ciliary body band. It is caused by the covering of the elongation of the trabecular meshwork. The width of the band is concerned with the width of chamber angle and varies from the different examining directions even in those of normal eyes. So that, attention must be paid to change the optical angle and to move the eyeball during examination. In certain cases, the front of the ciliary body band is covered by the elongated reticular tissue of the iris root. It belongs to the wide angle stereographically and can not be recognized as a narrow angle or a synchia.

(7) Root of iris: It is the portion connecting with the lower margin of the ciliary body band and

is the weakest and thinnest portion of the iris, so it is liable to lacerate in balbar contusion.

(8) Pectinate ligament (the process of the root of iris): It is a fine support projected from the root of iris. It may extend superiorly to the scleral spur or to the trabecular meshwork. Its colour is the same of the iris. It can not be seen in every eye. It is found only 231 cases from 500 normal eyes which we have been examined (46.2%).

(9) Terminal fold of iris: It is the most peripheral elevated fold of the iris. It varies in heightness and flatness of its surface. The chamber angle may be narrowed by a high fold. In such cases, the chamber angle is easily closed or adhered when they suffered from the glaucoma or iritis.



▲ 图 1. 前房角各部名称及其组织构造模式图 (張文山教授绘制)。

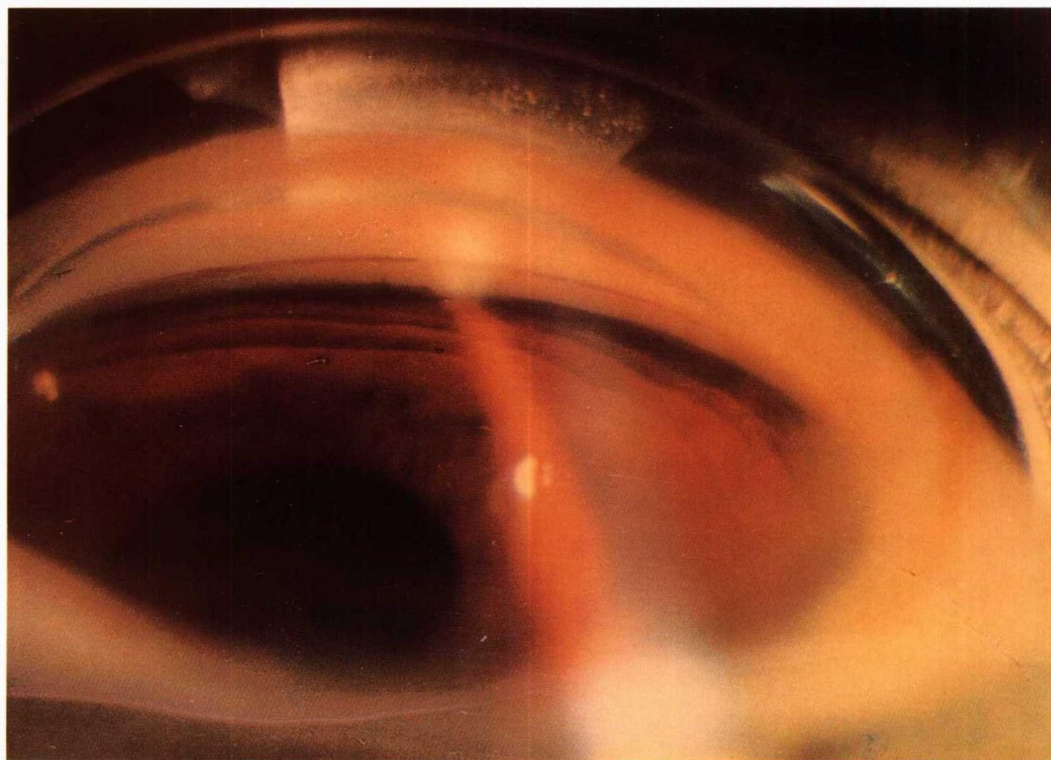
- | | | | |
|------------------|-------------|---------------|--------------|
| 1. 角膜 | 6. 睫状体带 | 14. 睫状肌放射纤维 | 21. 虹膜色素上皮层 |
| 1a 角膜光学切面 | 7. 虹膜 | 15. 睫状肌环状纤维 | 22. 缩瞳肌 |
| 1b 角膜圆顶内面 | 8. 梳状韧带 | 16. 虹膜大动脉环 | (1~13 为前房角镜检 |
| 1c 角膜缘内面 | 9. 晶状体 | 17. 巩膜静脉丛, 包括 | 查时所见。) |
| 2. Schwalbe 氏线或环 | 10. 睫状体 | 房水静脉 | |
| 3. 滤帘 | 11. 悬韧带 | 18. 睫状肌纵纤维 | |
| 4. Schlemm 氏管 | 12. 玻璃体 | 19. 巩膜 | |
| 5. 巩膜突 | 13. 裂隙窄光带照明 | 20. 晶体赤道部 | |

▲ Fig. 1 A diagram of various portions and structures of the anterior chamber angle (after Professor Zhang Wen shan)

- | | | | |
|----------------------------------|--|---|--|
| 1. Cornea | 6. Ciliary body band | 14. Radial fibres of ciliary muscles | 19. Sclera |
| 1a Corneal optic section | 7. Iris | 15. Circular fibres of ciliary muscles | 20. Equator of the lens |
| 1b Inner surface of corneal dome | 8. Pectinate ligament | 16. Large arterial circle of iris | 21. Pigmented epithelial layer of the iris |
| 1c Inner surface of the limbus | 9. Lens | 17. Scleral venous plexuses and aqueous veins | 22. Sphincter muscles of the pupil |
| 2. Schwalbe's line or ring | 10. Ciliary body | 18. Longitudinal fibres of ciliary muscle | (1 ~ 13 are the gonioscopic appearances) |
| 3. Trabecular meshwork | 11. Suspensory ligament | | |
| 4. Schlemm's canal | 12. Vitreous body | | |
| 5. Scleral spur | 13. Focal illumination of the narrow beam of slit-lamp | | |

▼ 图 2. 正常成年人前房角, 宽角, 可看到房角的全部, 滤帘呈灰黄色 (Goldmann 氏镜查)。

▼ Fig. 2 The anterior chamber angle in normal adult is wide. The trabecular meshwork is grey-yellowish (Goldmann's gonioscopy).



2. 本图谱使用的前房角镜及照像方法

在房角镜发明之前,临床上是无法检查房角的,只有解剖尸体或病眼摘出的眼球标本及在显微镜下进行组织切片检查时,方可见房角构造,眼科学者们认识到这一点,在长期地研究中都致力于能在临床上看到前房角的构造。在20世纪初叶,Trantas氏曾用压下与扭曲角巩膜缘,用检眼镜检查过房角,并介绍了“gonioscopy”这一名词。1914年,Salzmann氏使用接目镜检查房角,阐述了用接目镜能看见房角的光学原理,进一步用他的组织学的丰富学识对房角镜下所见的房角构造做了对照解释,并证实了房角之要点,为房角镜检查法奠定了基础。1919年Koeppel氏创制了一种房角接目镜,仍为现代所使用(图4)。1921年Troncoso氏制造了另一型房角镜及其单筒与双筒房角显微镜,并写出一本“房角镜检查法”(A Treatise on gonioscopy),把眼科的前半球疾病之诊断与治疗推进了一大步。1938年,Goldmann氏设计了一种用反光镜面的接目镜(图4),利用裂隙灯显微镜检查房角,在房角的检查研究上又迈进了一步。目前仍广泛地为眼科学界所使用。其他如Van Beuningen氏的四面反光镜,斗形房角镜,及Allen-Thorpe氏的四面棱镜等,似乎不甚简便,不为人们所欢迎。1950年笔者在张文山教授指导下开展了用Koeppel氏前房角镜检查法,1951年张文山教授在中华眼科杂志介绍了前房角镜检查法,俟后国内眼科才逐渐开展此项检查。1979年以来,在中国黄树春氏用小酒瓶检查前房角的启示下,笔者改进了瓶型房角镜,而且利用Kowa手持眼底照像机进行房角照像成功。瓶型房角镜检查前不必滴麻醉药,用具价廉,简便易行,像用洗眼杯一样,病人无痛苦,一人即可操作。

2. Gonioscope and photographic procedure

Before the invention of the gonioscope, the examination of chamber angle is not possible unless it is observed histologically with the specimens from the cadaver or an excised sick eyeball.

Many scholars of ophthalmology have this point always in mind and devote themselves to study how to examine the chamber angle in the clinic. Early in the 20th century, Trantas had examined the chamber angle with an ophthalmoscope by depressing and twisting the corneal limbus. He employed the term 'Gonioscopy' firstly. Salzmann examined the chamber angle with an eyepiece in 1914, and explained its optical principles. He contrasted the observations of the gonioscopy with his wealth histological knowledge of the eye to certify the essentials of the chamber angle. He laid a foundation of the method of examination of the chamber angle. In 1919, Koeppel invented a kind of gonioscope, and people are willing to use it at present (Fig. 4). Troncoso developed another type of monocular and binocular gonioscope in 1921, and wrote the 'A Treatise on Gonioscopy' to carry further the diagnosis and therapy of the diseases of anterior half of the eyeball. Goldmann designed an eyepiece with its own reflector (Fig. 4), and made use of the slitlamp to examine the chamber angle. This method still has wide usage in modern times. The other kinds of gonioscope such as four-sided reflector and dipper type of Van Beuningen, four-sided prism type of Allen-Thorpe etc. are not easy to operate, so they are unwilling in the ophthalmic circles.

We made use of Koeppel's gonioscope in the clinic under the direction of Professor Zhang Wenshan from 1950. In 1951, Professor Zhang Wenshan published his paper of gonioscopy in 'Chinese Journal of Ophthalmology'. Thereafter, this item of examination was carried out in China. Since 1979, we improved the bottle-style gonioscope of Dr. Huang Shuchun and began to take goniograph

successfully by using Kowa's portable eye fundus camera. This kind of bottle-style gonioscope does not require any anesthetic before examination. It is low priced, easy to operate, and painless. One person is enough to be the operator.



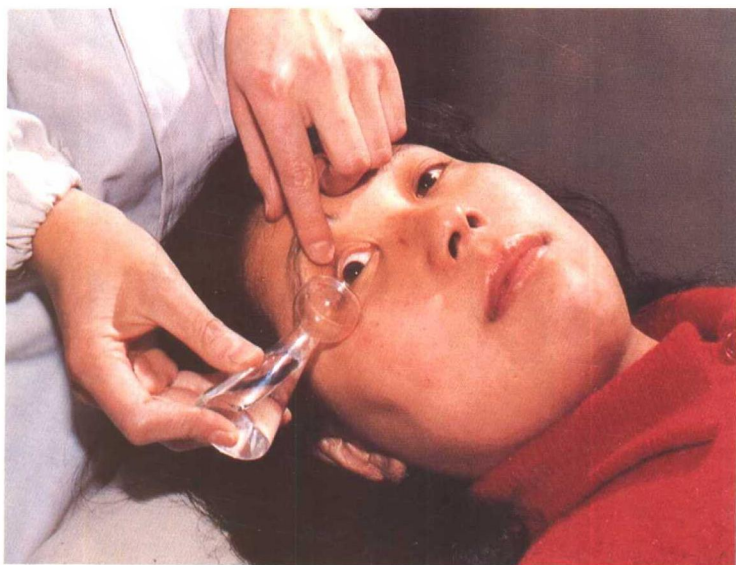
◀ 图 3. 改进的瓶型房角镜, 是根据黄树春利用瓶子进行房角检查法并参照 Koeeppe 氏房角镜原理研制而成。口径 25~32mm, 厚度 1mm。

◀ Fig. 3 The improved bottle-style gonioscope was developed on the basis of Huang Shuchun's gonioscopic bottle and referred to the principle of Koeeppe's gonioscope. It is 25~32 mm in calibre and 1 mm in thickness of its wall.

▶ 图 4. Koeeppe 氏及 Goldmann 氏前房角镜。

▶ Fig. 4 Koeeppe's and Goldmann's gonioscopes.



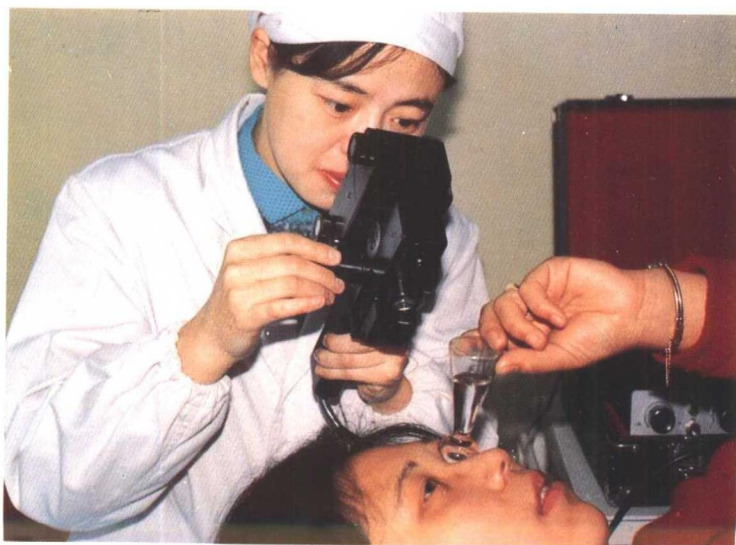


▲ 图 5. 卧式安放瓶型房角镜。

▲ Fig. 5 Put the bottle-style gonioscope in lying position.

▼ 图 6. 利用 Kowa 手持眼底照像机进行房角检查照像，也可用手持裂隙灯或手电筒、扩大镜进行检查。

▼ Fig. 6 Use the portable fundus camera, portable slit-lamp, or flash-light and magnifier to observe and take photograph of the anterior chamber angle.



3. 房角分级 (Scheie 氏分级法)

房角分级有多种方法, 本图谱采用 Scheie 氏分级法。其将房角分为宽窄两型, 又将窄角分为 4 级。

宽房角: 全部房角结构均能一目了然。

窄房角: 窄 I: 房角敞开, 略窄, 操作时需加压移动房角镜, 视线越过虹膜根部, 可看到睫状体带。窄 II: 房角较窄, 看不到睫状体带。窄 III: 房角极窄, 看不到滤帘的后半部。窄 IV: 房角最窄, 除 Schwalde 氏线外, 房角其他部分均看不到。

目前的各种分类法仍然不能完全包括临床之多端变化, 如最窄房角, 虹膜周边部亦可越过 Schwalde 氏线达到角膜, 同样的窄 III、窄 IV 级房角, 还可用窄光带区分为开角或闭角。虹膜根部与房角前壁紧贴, 即闭锁的房角, 用窄光带检查可见光带在角膜内面与虹膜相接处呈几何角模样, 而开角则可见窄光带有错开之缝隙, 分类过于复杂不便临床应用, 检查时注意如实记录。

3. Gradation of chamber angle (Scheie's method)

There are many methods to grade the chamber angle. The Scheie's method was adopted in this atlas.

The Scheie's method of gradation is to divide the chamber angle into narrow and wide two types:

The wide angle; The structures of chamber angle are clear at a glance.

The narrow angle; It can be subdivided into four grades: Grade I. the chamber angle is opened, but slightly narrowed. Depressing and moving the gonioscope are required during operation. The ciliary body band can be seen when keep the sight through the root of iris. Grade II. the angle is comparatively narrow and can not catch the sight of the ciliary body band. Grade III. the chamber angle is very narrow. The posterior half of trabecular meshwork is not visible. Grade IV. the chamber angle is most narrow. The structures of chamber angle can not be seen except the Schwalbe's line.

The various patterns of the chamber angle can not be included totally in any classification of various ophthalmologists. For example, the peripheral portion of iris may cross the Schwalbe's line to the cornea in the most narrow chamber angle. The chamber angle of Grade III or IV also can be divided into open and close angle types by a narrow beam of light. In the cases of the root of iris adhered with the anterior wall of chamber angle (i. e., the closed chamber angle), the light beam can be seen like a geometric angle at the conjunction of the inner surface of the cornea and the iris. The narrow light beam has a crevice in the open chamber angle. If a classification is too complicated, it is inconvenient for clinic use. Record the examination accurately is most important.

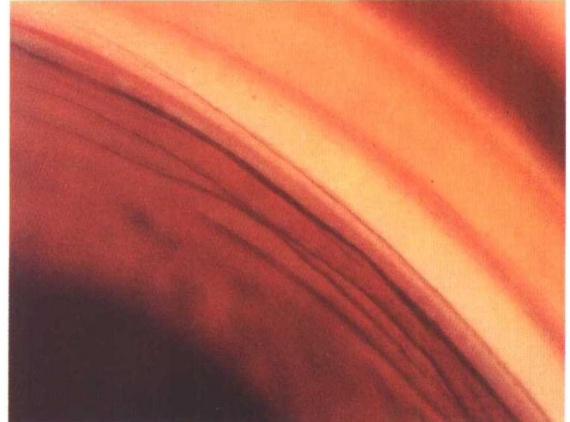
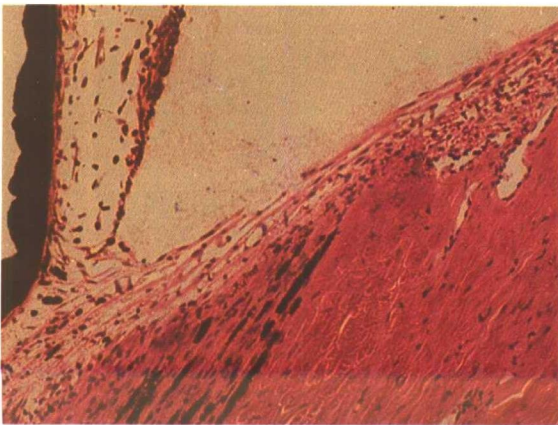


▲图 7. 宽角：房角全部结构可见。睫状体带显示最宽（但要与房角后退鉴别），多见于正常眼，也可见于开角青光眼。

▲ Fig. 7 Wide angle. All structures of chamber angle can be seen. The ciliary body band is shown most widely (but it should be distinguished from the angle recession). It is more common in normal eye and also can be found in the open angle glaucoma.

▼图 8. 宽角组织学所见：房角各部组织显示清楚，角巩膜滤帘及葡萄膜滤帘清楚可见。

▼ Fig. 8 The histological appearances of wide angle : The structures of every part of chamber angle are shown markedly. Corneoscleral and uveal trabecular meshworks are visible.



▲图 9. 窄角 I 级：睫状体带较宽角为窄，房角其他部分也均可看到，常见于正常眼，也可见于开角青光眼。

▲ Fig. 9 Narrow angle, grade I : The ciliary body band is more narrow than wide angle. Other parts of chamber angle can be seen. It is common in normal eye and can be found in open angle glaucoma.

▼图 10. 窄角 I 级组织学所见：虹膜根部掩盖部分睫状体。

▼ Fig. 10 Histological appearances of narrow angle grade I : A part of ciliary body is hidden by the iris root.

