

# Optical Coherence Tomography Observed Fundus Changes of Hypertensive Disorders Complicating Pregnancy

Wenying Wang

Cangzhou Central Hospital

Zhi-xue Wang (✉ [wangzhixue5@163.com](mailto:wangzhixue5@163.com))

Cangzhou Central Hospital

---

## Research article

**Keywords:** hypertensive disorders complicating pregnancy, pregnancy-induced hypertension, retina disease, optical coherence tomography

**Posted Date:** October 6th, 2020

**DOI:** <https://doi.org/10.21203/rs.3.rs-80170/v1>

**License:** © ⓘ This work is licensed under a Creative Commons Attribution 4.0 International License.

[Read Full License](#)

---

# Abstract

**Background** By optical coherence tomography(OCT) observed fundus changes of hypertensive disorders complicating pregnancy.

**Methods** Inspected patients with hypertensive disorders complicating pregnancy accepted eye examination including corrected visual acuity, slit lamp examination, fundus examination, OCT

**Results** 1.OCT examination results of abnormal 148, which neurosensory serous retinal detachment 84eyes (56.76%), pigment epithelium and the IS / OS layer change 38 eyes (25.68%), optic disc oedema and retinal haemorrhage and other changes of 26 eyes (17.56%). 2. Between different phenotypes OCT of Patients with oedema, proteinuria, blood pressure and course had differences ( $P < 0.05$ ), and had a correlation between the two.3. Between different phenotypes OCT of Patients with gestational age, age, whether it is the first child was irrelevant ( $P > 0.05$ ).4. Between different phenotypes OCT of Patients with visual acuity, fundus lesions and eye symptoms had differences ( $P < 0.05$ ), and had a correlation between the two ( $P < 0.05$ ).

**Conclusions** OCT can understand the severity of fundus changes with hypertensive disorders complicating pregnancy , and provide evidence about clinical diagnosis and treatment, prognosis.

## Background

Hypertensive Disorders Complicating Pregnancy has been used to be called as Pregnancy-Induced Hypertension Syndrome and shortened to PIHS. It is an endemic disease, including Hypertensive Disorders Complicating Pregnancy, Pre-eclampsia, Eclampsia, Pre-eclampsia Superimposed upon Chronic Hypertension and Chronic Hypertension Complicating Pregnancy, among pregnant women, which predominantly happens at the third trimester of pregnancy with the significant symptoms, such as oedema, proteinuria and hypertension. The pathogenesis and treatment for the first three diseases are different from those for the last two ones. Our study here mainly focuses on the first three diseases. Besides, the fundus change is also quite common among some of the patients with PIHS, in which case, the fundus examination result has been used as the significant criteria to assess the PIHS progression in the clinical treatment during past years. However, with the extensive employment of Optical Coherence Tomography (OCT), a non-contact, non-intrusive and high-resolution imaging method, in Ophthalmology in recent years, people have obtained better understanding about retina disease. Now we would like to share our studying on the results of fundus detection and OCT for 98 inspected patients with Prenatal PIHS from our hospital as below:

## Methods

1. Introduction to patients and studying means

1.1 General Information Collecting

Our 98 inspected patients were the pregnant women, registered at our hospital from December 2016 to October 2019, who were all diagnosed, by Obstetric Department, with PIHS while being clear on previous history of Chronic Hypertension, cardiovascular disease, Diabetes, or kidney disease etc. All of these 98 patients, 63 of them are primipara, the rest of 35 ones are pluripara, who are aging from 23 to 45 with the average age of  $29.10 \pm 4.88$ , while in which, 12 patients are aging from 20 to 25, 51 patients are aging from 25 to 30, 18 patients are aging from 30 to 35, and 17 patients are aging over 35, are diagnosed with fundus change when they are under the eye examination. At their first time visiting moment at our department for the eye examination, which is in their gestational age of 21 to 39 (only full weeks are counted), and the average gestational age of  $34.03 \pm 3.46$ , they have been diagnosed with PIHS averagely for  $10.22 \pm 8.60$  days, and the average systolic and diastolic pressure are  $178.28 \pm 15.57$  mmHg and  $94.34 \pm 6.16$  mmHg respectively. While the data of the referenced group for the pregnant women who visited Obstetric Clinic in the corresponding period are 45 people (90 eyes), 35 of them are primipara, 15 ones are pluripara, whose corrected visual acuity are all over 1.0 with the age ranging from 24 to 42 with the average age of  $27.12 \pm 4.15$ , are all clear on PIHS, Diabetes, any organic eye disease or other systemic diseases effecting the eyes etc., and no history of Chronic Hypertension, cardiovascular disease, or kidney disease etc. At the visiting moment, which is in their average gestational age of  $35 \pm 3.12$ , the average systolic and diastolic pressure are  $115.33 \pm 5.61$  mmHg and  $74.21 \pm 5.17$  mmHg respectively. With the above comparisons, the statistical difference only exists in comparison on blood pressure, but not on age and gestational age.

1.2 According to *Obstetrics (8th Edition)* <sup>[2]</sup>, there are three criteria for diagnosing PIHS, and they are Hypertensive Disorders Complicating Pregnancy, Pre-eclampsia (mild and severe) and Eclampsia. Among our 98 inspected patients, 10 patients (10.21%) have Hypertensive Disorders Complicating Pregnancy, 22 patients (22.44%) have mild Pre-eclampsia, 60 patients (61.23%) have severe Pre-eclampsia and 6 patients (6.12%) have Eclampsia. All of them have accepted the eye examinations including corrected visual acuity, slit lamp examination, fundus detection and OCT (HD-OCT4000 by Zeiss). According to *Practice of Ophthalmology (3rd Edition)* <sup>[1]</sup>, there are three stages for Retinopathy, Stage I: Arterial Spasm, Stage II: Arteriosclerosis, Stage III: Retinopathy, such as retinal oedema, haemorrhage, exudation, retinal detachment, and papilledema etc. Among the 98 PIHS patients (196 eyes), 15 eyes' symptom are at Stage I (7.65%), 26 eyes' symptom are at Stage II (13.26%), and 155 eyes' symptom are at Stage III (79.09%). Meanwhile, 86 patients (166 eyes, for 6 patients claimed the symptom happened only to one eye) claim that they have eye disease symptoms, including vision loss, photophobia, diplopia and vision distortion etc.

1.3 Each PIHS patient is assigned to a specific doctor, whom will be in charge of the patient's fundus detection, OCT examination, blood pressure examination, proteinuria examination, oedema testing, and rating for the oedema and protein examination results.

1.4 With SPSS 20.0, the Chi-Square Tests will be run with the data of OCT phenotypes for the inspected patients and the referenced group, patients' oedema, proteinuria, blood pressure, disease progress, age,

fundus lesion and eye symptom. When the theoretical frequency is less than 1, the Fisher Exact Test and Pearson conducted at the same time for analysis, the statistical significant is found ( $P < 0.05$ ).

## Results

**2.1 OCT Phenotypes:** Among the 98 inspected patients (196 eyes), the initial OCT examination reports that there are 148 eyes have eye symptoms, among which 84 eyes are with neurosensory serous retinal detachment (56.76%), including 50 eyes with detachment at central fovea of macula (Fig A), while 12 of the 50 are also complicating with epithelium oedema (Fig B), and 34 eyes with detachment at peripheral nerve around fovea centralis, which mainly happens to the peripheral area of the optic disc (Fig C), 38 eyes are with pigment epithelium and the IS / OS layer change (25.68%) (Fig D), and 26 eyes are with other changes, such as optic disc oedema and retinal haemorrhage etc. (17.56%) (Fig E & F) Among the 45 pregnant women (90 eyes) from the referenced group, there are 2 eyes have minor pigment epithelium and the IS / OS layer change, and no obvious eyes symptom is found from other women's OCT examination. The statistical difference could be found in these two groups OCT examination phenotypes ( $\chi^2 = 145.473$ ,  $P = 0.000 < 0.05$ ).

**2.2 Categorise OCT Phenotypes into There Groups:** Group One is for retinal nerve epithelium detachment. Group Two is for pigment epithelium (previously called as IS/OS layer) change. Group three is for optic disc oedema and retinal haemorrhage etc. The relationships between these three OCT phenotypes and the patients' general symptoms such as oedema, proteinuria, blood pressure and gestational age will be analysed respectively.

**2.2.1 Correlation Degree between PIHS patients' oedema stages and OCT Phenotype( Table 1):** Patients' oedema stages could be classified as (-) is for absent. (+) is for pitting oedema on feet, ankles and shanks, which would not be subsided after a rest. (++) is for oedema extended from feet to thigh with the orange skin colour. (+++) is for oedema spread to abdomen and vulva with shiny skin in the impacted area. (+++++) is for anasarca along with ascites. Results: The oedema stages for patients with different OCT phenotypes are varied and correlated to each other. (The oedema stages and OCT phenotypes:  $\chi^2 = 33.670$ ,  $P = 0.000 < 0.05$ , Correlation Degree: 0.054)

**2.2.2 Correlation Degree between OCT phenotypes and PIHS patients' proteinuria levels( Table 2):** The patients' proteinuria levels could be classified as (-) is for quantity of urine protein less than 0.2 g/L, (+) is for quantity of urine protein ranging from 0.2 g to 1.0 g/L, (++) is for quantity of urine protein ranging from 1.0 g to 2.0 g/L, (+++) is for quantity of urine protein ranging from 2.0 g to 4.0 g/L, and (+++++) is for quantity of urine protein more than 4.0 g/L. Results: The proteinuria levels for patients with different OCT phenotypes are varied and correlated to each other. (The proteinuria levels and OCT phenotypes:  $\chi^2 = 30.745$ ,  $P = 0.000 < 0.05$ , Correlation Degree: 0.063)

**2.2.3 Correlation Degree between OCT phenotypes and PIHS patients' blood pressure( Table 3):** According to the defined grading method of blood pressure in *Guide on Prevention and Control of Hypertension in*

*China (Revised Edition in 2005)*, the blood pressure has been graded as Grade I, in which the hypertension systolic pressure ranges from 140 to 159 mmHg, or the diastolic pressure ranges from 90 to 99 mmHg; Grade II, in which the hypertension systolic pressure ranges from 160 to 179 mmHg, or the diastolic pressure ranges from 100 to 109 mmHg; and Grade III, in which the hypertension systolic pressure is equivalent to or higher than 180 mmHg, or the diastolic pressure is equivalent to or higher than 110 mmHg. Result: The blood pressure for patients with different OCT phenotypes are varied and correlated to each other. (The blood pressure and OCT phenotypes:  $\chi^2 = 35.708$ ,  $P = 0.000 < 0.05$ , Correlation Degree: 0.105)

2.2.4 Correlation Degree between OCT phenotypes and PIHS patients' gestational age( Table 4): Results: The patients' gestational age has no impact to the OCT phenotypes. (Gestational age and OCT phenotypes  $\chi^2 = 10.743$ ,  $P = 0.092 > 0.05$ )

2.2.5 Correlation Degree between OCT phenotypes and PIHS patients' age: Results( Table 5): The patients' age has no impact to the OCT phenotypes. (Age and OCT phenotypes  $\chi^2 = 11.293$ ,  $P = 0.073 > 0.05$ )

2.2.6 Correlation Degree between OCT Phenotypes and PIHS patients' number of times for being pregnant: Results( Table 6): The number of times for being pregnant has no impact to the OCT phenotypes. (The number of times for being pregnant and the OCT phenotypes  $\chi^2 = 2.128$ ,  $P = 0.554 > 0.05$  )

2.2.7 Correlation Degree between OCT Phenotypes and PIHS patients' disease progress( Table 7): Results: The disease progress for patients with difference OCT phenotypes are varies and correlated to each other. (The disease progress and OCT phenotypes  $\chi^2 = 19.244$ ,  $P = 0.003 < 0.05$ , Correlation Degree 0.050)

2.2.8 Correlation Degree between OCT Phenotypes and PIHS patients' corrected visual acuity( Table 8): Results: The visual acuity for patients with different OCT phenotypes are varied and correlated to each other. (The corrected visual acuity and OCT phenotypes  $\chi^2 = 27.362$ ,  $P = 0.000 < 0.05$ , Correlation Degree 0.250)

2.2.9 Correlation Degree between OCT Phenotypes and PIHS patients' Fundus Changes( Table 9): Results: The fundus changes for patients with different OCT phenotypes are varied and correlated to each other. (Fundus Changes and OCT phenotypes  $\chi^2 = 69.619$ ,  $P = 0.000 < 0.05$ , Correlation Degree 0.364)

2.2.10 Correlation Degree between OCT Phenotypes and PIHS patients' self-claimed eye symptom( Table 10)s: Results: The self-claimed eye symptoms for patients with different OCT phenotypes are varied and correlated to each other. (Eye symptoms and OCT phenotypes  $\chi^2 = 50.275$ ,  $P = 0.000 < 0.05$ , Correlation Degree 0.272)

## Discussion

Hypertensive Disorders Complicating Pregnancy has been used to be called as Pregnancy-Induced Hypertension Syndrome and shortened to PIHS. Generally speaking, it always happens after 20 weeks of the pregnancy with the pathophysiological changes of systemic small vessel spasm, endothelium injury and ischemia. With previous experience, the PIHS patients' fundus changes have close connection to the patients' general clinical manifestation. For example, the higher the blood pressure and proteinuria level are, which are the indicators for the severity of PIHS, the more obvious the fundus changes are<sup>[3]</sup>. Besides, since the retinal vessels in fundus is the only part for directly observing the vessel changes in living people, the fundus detection result is always a vital indicator for PIHS diagnosis. For patients with fundus change in early stage, if their blood pressure could be lowered accordingly, in which case they are clear on the fundus changes, after taking rest, being tranquillised, releasing spasm, taking hypotensor and diuretics etc., they could continue the pregnancy with the intensive monitor on the maternal-fetal status. Otherwise, if the patients are failed to respond to these medical treatments, especially when, after the treatments, they have the symptoms such as retinal oedema, exudation or haemorrhage, which means there is organic damage to the retina and general small artery, the pregnancy should be terminated accordingly to avoid any severe complication afterwards. Therefore, the diagnosis results on fundus change, especially on the severe retinopathy, should be a vital reference for the necessity of conducting pregnancy termination<sup>[4]</sup>. However, some of the severe retinal diseases, such as retinal oedema and limited retinal detachment etc., especially for the latter one, might be missed in the fundus detection by the eye ultrasound examination, for the contrast medium used in which are not suitable for the pregnant women. On the contrary, OCT, with its non-invasive and reproducible characteristic, high resolution and cross section imaging technique, could be used for the ocular tissue micro-imaging, especially for the imaging of retina and its neighbouring tissues. There are some studies have found that the retinal disease is correlated to optic disc peripheral, the thickness of retinal nerve fibre layer at the central fovea of macula, and the continuity change in the outer retinal structure<sup>[5, 6, 7]</sup>. Our study also finds that the OCT examination results for healthy pregnant women are normal, but the results are abnormal for the PIHS patients, which could be summarised into three phenotypes related to the patients' general system status, especially to the patients' blood pressure, oedema and proteinuria. The higher the blood pressure is, the severer the oedema and proteinuria will be. Also, the higher the blood pressure is, the more possible the patients will be diagnosed with retinal haemorrhage and optic disc oedema, which are seconded only to retinal epithelium oedema, in OCT. Besides, our study also finds that the OCT phenotypes will not be impacted by the patients' gestational age, age and the number of times for being pregnant, but by the patients' disease progress, in which case the patients with short disease progress will be more possible to be diagnosed with epithelium oedema, while the ones with long disease progress will be more possible to be in the middle of recovering from the fundus changes, for some of them have get the blood pressure under control.

With fundus angiography, some studies find that it is quite common among the early stage PIHS patients that they have the symptom, in varied degrees, of slow choroid filling or without reperfusion, in other words, choroid ischemia, which are shown as faint or dark areas, indicating pigment epithelium change with damage and dysfunction caused by choroid ischemia, in the fundus angiography.<sup>[8, 9, 10]</sup> This

change is often diagnosed in the patients' optic disc peripheral and the macular area, for which are areas most of the choroid artery watershed and vein vertical watershed are distributed around. With the comparatively poor blood circulation here, the optic disc peripheral and the macular area are also the areas with the greatest occurrence of dysfunctional choroid circulation and pigment epithelium damage, complicating with fluid filled in the retina here, where OCT could detect properly, by ischemia and hypoxia. According to our study, the main OCT phenotypes for PIHS patients are neurosensory serous retinal detachment 84 eyes (56.76%), which is mainly diagnosed in the optic disc peripheral and the macular area, pigment epithelium and the IS / OS layer change 38 eyes (25.68%), optic disc oedema and retinal haemorrhage and other changes of 26 eyes (17.56%) respectively. Moreover, according to the patients' self-claim, the retinopathy in the macular and optic disc peripheral area has the predominant impact on their visual acuity. Our study also finds the OCT phenotypes are correlated to the patients' corrected visual acuity, the severity of the fundus changes and the patients' self-claimed symptoms, which not only proves the coherence between OCT and fundus detection, but also the advantage that OCT has for observing the retinal microstructure changes.

According to our study, for patients, who are diagnosed with neurosensory oedema retinal detachment by OCT, they are always in the middle of the disease progress with the severe fundus change and poor systemic health condition so that they are required to be taken care of by intensive monitoring on their eye and systemic health condition with positive medical treatment. The relevant medical solution of necessity, such as pregnancy termination, should be conducted in accordance with the monitoring. While, for patients, who are diagnosed with pigment epithelium and IS/OS layer change, they are always in the end of the disease progress, a recovering or stabilized period for the fundus changes, so that they should continue current treatment along with health condition observation. With OCT examination on their fundus recovering status when they visit our department, we find that although some of the patients' health condition have been stabilised by getting blood pressure under control, the pigment epithelium and IS/OS layer change has not recovered yet.

## Conclusions

Therefore, the pregnant women, with the gestational age longer than 20 weeks and the hypertension history or the potential to have unstable blood pressure, should take OCT and fundus detection while they are doing the prenatal examination so that their fundus changes status, which is a vital reference to clinical diagnosis, treatment and prognostic judgements, could be tracked accordingly.

## Abbreviations

OCT: optical coherence tomography

IS/OS: photoreceptor inner segment/outer segment junction

PIHS: pregnancy-induced hypertension syndrome

## Declarations

This study was reviewed and approved by the Cangzhou Central Hospital ethics committee (Batch number:2015-076). And patients signed clinical informed consent. Data and information are available, and there is no interest dispute or project funding.

## Consent for publication

Written informed consent was obtained from the patient for publication of this study and any accompanying images. A copy of the written consent is available for review by the Editor of this journal.

## Availability of data and materials

The datasets generated and/or analyzed during the current study are not publicly available due to protection of the patient's personal information but are available from the corresponding author on reasonable request.

## Competing interests

The authors declared no potential conflicts of interest with respect to the research, authorship, and/or publication of this article.

## Funding

This research received no specific grant from any funding agency in the public, commercial, or not-for-profit sectors.

## Authors' contributions

WW is responsible for collecting data, collating data, and writing papers. ZW is responsible for collating information, statistics, and revising papers. All authors have read and approved the manuscript, and ensure that this is the case.

## Acknowledgement

Not Applicable

## References



1. Yue, Jie. *Obstetrics and Gynaecology, Edition 6* [M]. Beijing. People's Medical Publishing House Co., LTD. 2003: 97-104
2. Liu, Jiaqi & Li, Fengming. *Practice of Ophthalmology, Edition 3* [M]. Beijing. People's Medical Publishing House Co., LTD. 2010: 429-430
3. Xu, Yuan. *Clinical Analysis on Fundus Changes in Pregnancy-Induced Hypertension Syndrome* [J]. Sichuan Medical Journal, 2012, 22 (3): 413-414
4. Liao, Yinglin. Liu, Ruiying. Xing, Yichun et al. *Clinical Observation on Fundus Changes in Pregnancy-Induced Hypertension Syndrome* [J]. Practical Clinical Medicine, 2006, 7 (9): 126
5. Xia, Zheren. Zhang, Jia. Gou, Suqing et al. *Examination on Retina Thickness at Macular in Teenagers with Amblyopia via Optical Coherence Tomography* [J]. The Journal of Practical Medicine, 2012, 28 (21): 3589-3591
6. Wang, Xueqing. Zhai, Nan. Chen, Yibing et al. *Optical Coherence Tomography Observed Changes on Diabetes' Macular Post-Phacoemulsification* [J]. The Journal of Practical Medicine, 2013, 29 (20): 3442-3443
7. Guo, Lili & Yu, Wenzhen. *Application Value of Optical Coherence Tomography in Assessing the Post-Operation Visual Acuity Improvement in the Idiopathic Epiretinal Macular Membrane Patients* [J]. Chinese Journal of Experimental Ophthalmology, 2015, 33(1): 66-69
8. Fastenberg, D.M., Fetkenhour, C.L., Choromokos, E. et al. *Choroidal Vascular Changes in Toxemia of Pregnancy* [J]. Am J Ophthalmol, 1980, 89 (3): 362-368
9. Sathish, S. & Arnold, J.J. *Bilateral Choroidal Ischaemia and Serous Retinal Detachment in Pre-Eclampsia* [J]. Clin Exp Ophthalmol, 2000, 28 (5): 387-390
10. Guo, Jia. Liu, Guangfeng. Fan, Ying et al. *Fundus Fluorescein Angiography Phenotypes for Six Pregnancy-Induced Hypertension Syndrome Patients at Recovery Stage*, Chinese Journal of Ocular Fundus Disease, 2012, 28 (4): 411-413

## Tables

Table 1  
Correlation Degree between OCT Phenotypes and PIHS patients' oedema stages [n(%)]

Oedema Stages	n	OCT Phenotypes			
		0(n = 48)	1(n = 84)	2(n = 38)	3(n = 26)
-	6	5 83.34%	0 0.00%	0 0.00%	1 16.66%
+	38	12 31.58%	9 23.68%	14 36.84%	3 7.90%
++	80	19 23.75%	32 40.00%	17 21.25%	12 15.00%
>=+++	72	12 16.66%	43 59.73%	7 9.73%	10 13.88%

Table 2  
Correlation Degree between OCT Phenotypes and PIHS patients' Proteinuria Levels [n(%)]

Proteinuria Level	n	OCT Phenotypes			
		0(n = 48)	1(n = 84)	2(n = 38)	3(n = 26)
-	4	3 75.00%	0 0.00%	0 0.00%	1 25.00%
+	28	13 46.43%	5 17.86%	8 28.57%	2 7.14%
++	82	15 18.30%	34 41.46%	23 28.04%	10 12.20%
>=+++	82	17 20.74%	45 54.87%	7 8.53%	13 15.86%

Table 3  
Correlation Degree between OCT Phenotypes and PIHS patients' blood pressure [n(%)]

Blood Pressure	n	OCT Phenotypes			
		0(n = 48)	1(n = 84)	2(n = 38)	3(n = 26)
Grade I	20	12	2	5	1
		60.00%	10.00%	25.00%	5.00%
Grade II	64	15	21	22	6
		23.44%	32.82%	34.37%	9.37%
Grade III	112	21	61	11	19
		18.75%	54.46%	9.83%	16.96%

Table 4  
Correlation Degree between OCT Phenotypes and PIHS patients' gestational age [n(%)]

Gestational Age	n	OCT Phenotypes			
		0(n = 48)	1(n = 84)	2(n = 38)	3(n = 26)
0-	30	5	20	3	2
		16.67%	66.66%	10.00%	6.67%
32-	96	21	42	19	14
		21.88%	43.74%	19.80%	14.58%
36-	70	22	22	16	10
		31.43%	31.43%	22.86%	14.28%

Table 5  
Correlation Degree between OCT Phenotypes and PIHS patients' age [n(%)]

Age	n	OCT Phenotypes			
		0(n = 48)	1(n = 84)	2(n = 38)	3(n = 26)
20-	24	2	12	8	2
		8.33%	50.00%	33.34%	8.33%
25-	102	30	39	15	18
		29.42%	38.23%	14.71%	17.64%
30-	70	16	33	15	6
		22.86%	47.14%	21.43%	8.57%

Table 6  
Correlation Degree between OCT Phenotypes and PIHS patients' number of times for being pregnant [n(%)]

Number of times for being pregnant	n	OCT Phenotypes			
		0(n = 48)	1(n = 84)	2(n = 38)	3(n = 26)
1st time	126	33	56	23	14
		26.18%	44.45%	18.25%	11.12%
2nd time and more	70	15	28	15	12
		21.43%	40.00%	21.43%	17.14%

Table 7  
Correlation Degree between OCT Phenotypes and PIHS patients' disease progress [n(%)]

Disease Progress(Days)	n	OCT Phenotypes			
		0(n = 48)	1(n = 84)	2(n = 38)	3(n = 26)
0-	124	28	64	14	18
		22.58%	51.62%	11.28%	14.52%
10-	38	10	11	14	3
		26.32%	28.94%	36.84%	7.90%
20-	34	10	9	10	5

Table 8  
Correlation Degree between OCT Phenotypes and PIHS patients' corrected visual acuity [n(%)]

Corrected Visual Acuity	n	OCT Phenotypes			
		0(n = 48)	1(n = 84)	2(n = 38)	3(n = 26)
0.0-	35	2	19	8	6
		5.72%	54.29%	22.85%	17.14%
0.5-	152	37	65	30	20
		24.35%	42.76%	19.74%	13.15%
1.0-	9	9	0	0	0
		100.0%	0.00%	0.00%	0.00%

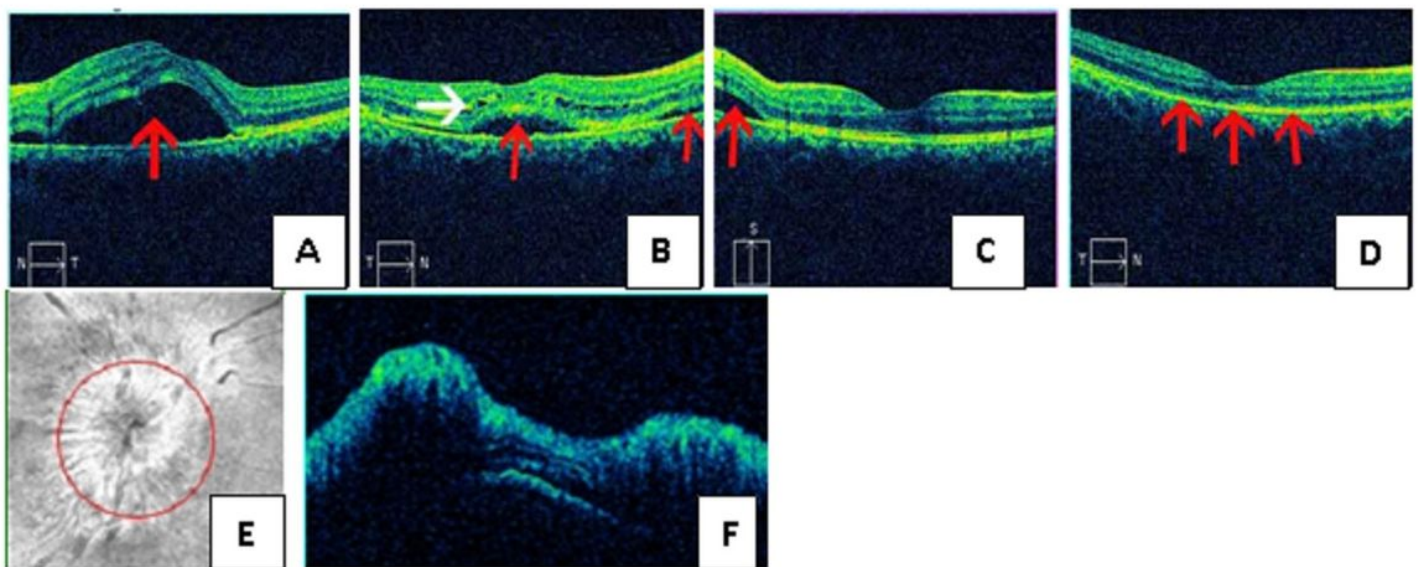
Table 9  
Correlation Degree between OCT Phenotypes and PIHS patients' Fundus Changes [n(%)]

Fundus Changes	n	OCT Phenotypes			
		0(n = 48)	1(n = 84)	2(n = 38)	3(n = 26)
Stage I	15	15	0	0	0
		100.0%	0.00%	0.00%	0.00%
Stage II	26	12	2	11	1
		46.15%	7.70%	42.31%	3.84%
Stage III	155	21	82	27	25
		13.55%	52.91%	17.41%	16.13%

Table 10  
Correlation Degree between OCT Phenotypes and PIHS patients' self-claimed eye symptoms [n(%)]

Eye Symptoms	n	OCT Phenotypes			
		0(n = 48)	1(n = 84)	2(n = 38)	3(n = 26)
Yes	166	26	84	32	24
		15.67%	50.61%	19.27%	14.45%
No	30	22	0	6	2
		73.34%	0.00%	20.00%	6.66%

## Figures



**Figure 1**

OCT image of hypertensive disorders complicating pregnancy patients. (A) OCT image for macula centralis retinal nerve epithelium detachment (pointed by the red arrow). (B) OCT image for macula centralis and temporal side of optic disc retinal nerve epithelium detachment (pointed by the red arrow) complicating with the retinal nerve epithelium cystoid oedema (pointed by the white arrow). (C) OCT image for nasal side of central fovea of macula retinal nerve epithelium detachment (pointed by the red arrow), the detachment is clear at the central fovea of macula. (D) OCT image for irregular, discontinuous and fragmentary pigment epithelium and the IS / OS layer (pointed by the red arrow). (EF) OCT image for optic disc oedema and retina incrustation around optic disc.