

Clinical features and classification of Seasonal endophthalmitis Seasonal hyperacute Panuveitis based on the largest outbreak cases in Nepal

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Abstract

Background:

Clinical features of Seasonal endophthalmitis (SE)/ Seasonal hyperacute Panuveitis (SHAPU) has been evolved significantly over the past 5 decades ever since its discovery in 1975. The aim of this study was to evaluate variations in the clinical presentation according to the duration of symptoms, characterize its endophthalmitic features, and develop an evidence-based clinical classification.

Methods:

This retrospective study included SHAPU cases presenting during the 2015–2016 outbreaks, and had clinical features of unilateral acute endophthalmitis without systemic infection, ocular trauma, or prior intraocular surgery. Patients underwent relevant ophthalmic examinations, and cases were categorized as early (upto 2 days), mid (2 to 7 days), or late stage (7 days) according to duration of symptoms. Data were entered in Microsoft Excel and analyzed using SPSS v20, with $p < 0.05$ considered statistically significant (2 tailed).

Results:

A total of 123 SHAPU cases from 2015 and 2016 outbreaks were included in the study. Severe visual impairment ($< 3/60$ –NPL) was present in 56.1% of eyes. Hypopyon was found in 69.9% eyes (90.9% early vs. 30.0% late stage; $p < 0.001$). Fibrinous exudates were seen in 67.5% (75.8% early vs 40.0% late stage; $p = 0.002$) and lid swelling in 28.5% (36.4% early vs 10.0% late stage; $p = 0.027$). Loss of iris pattern with hyperchromia was the commonest iris abnormality (65.2%). The most common B-scan finding was moderate vitreous echodensity (44.6%), increasing from 20.7% to 60.7% in late stage. Retinochoroidoscleral complex thickening was observed in 56.8% (34.5% early vs 57.1% late stage; $p = 0.012$). Leukocoria was noted in 52.5% (11.1% early vs 62.5% late) and bright red fundal glow decreased from 66.7% early to 12.5% late ($p < 0.001$). Colourless vitreous samples were observed in 46.7% eyes (78.8% early vs. 26.7% late; $p < 0.001$).

Conclusions:

The clinical features of SHAPU are more similar to endophthalmitis than panuveitis. The severity of the disease is not solely related to the time of presentation. There may be severe inflammation or infection even in the cases presenting early. Hence identifying severity of the disease based on clinical findings rather than on the time of presentation and managing accordingly will be more useful for ophthalmologists managing SHAPU cases.

Background

Seasonal hyperacute panuveitis (SHAPU), also known as Seasonal endophthalmitis (SE), is a sight threatening ocular disease very unique to Nepal. [1] Since its identification 51 years back in 1975, several outbreaks and numerous cases have been reported from different parts of the country.[2–6] Only since few years, there are few cases being reported from Bhutan.[7, 8] This causes unilateral blindness in children due to its unilateral involvement. The specific kind of white moth called Gaazalina species is suspected to be the risk factor.[1] In one of the outbreaks, 23% SHAPU cases reported white moth contact just before the onset of disease. [3] Through one epidemiological study, the strongest risk factor of SHAPU is now identified as a moth. [9] Since the hilly terrains of Nepal is the habitat for the Gazalina moths due to its vegetation on which they feed and breed, the outbreaks of SHAPU occurs mostly in hilly area of Nepal. [3, 10] The major outbreak time in every alternate autumn season (August to December) of even English year. However small outbreak occurs in the spring and summer time of every even English year. [3] The clinical features of SHAPU was described for the first time 51 years back[11]. Many additional clinical findings from 2009-10 outbreak has been reported. [3] One research paper on classification of SHAPU based on the experience of a group of ophthalmologists who treated SHAPU cases is available. [12]

The aim of this paper is to study clinical features systematically in SHAPU cases presenting at Tilganga Institute of Ophthalmology (TIO) by studying the largest SHAPU outbreak which has happened till date in 2015-16 and utilize those in classifying SHAPU based on duration of symptoms. As TIO is one of the primary referral centers for SHAPU since 2005 and gets most of the outbreak cases, its data are likely representative of the whole outbreak.

Methods

The study population was derived from previously reported 2015–2016 outbreak cohort, for which details of demographic information, study setting and clinical evaluation process have been described elsewhere [14]. All SHAPU cases during that outbreak were included in the present retrospective analysis.

Unilateral acute intraocular inflammation suggestive of endophthalmitis in the absence of systemic infection, penetrating ocular trauma, or prior intraocular surgery in either eye was diagnosed as SHAPU. The diagnostic criteria included sudden onset of redness and loss of vision with rapid progression, severe anterior chamber inflammation with hypopyon, extensive posterior synechiae or fibrinous exudates, grade 3–4 anterior chamber cells, poor fundus visibility or leukocoria without cataract, and clinically evident vitreous inflammation or vitreous echodensities on B-scan ultrasonography when the posterior segment examination was not possible. The electronic medical records were reviewed for demographic information, duration of symptoms at presentation, detailed clinical findings, and vitreous tap consistency and color. The detailed procedures of ophthalmic examination have been reported

previously [14]. Patients visual acuity assessment, anterior and posterior segment assessment, intraocular pressure measurement and B-scan ultrasonography was conducted as required.

Grading of the anterior chamber reaction and the vitreous inflammation was done based on the SUN classification.[13] Based on the duration of symptoms in days at presentation, SHAPU is classified as early stage (upto 2 days), mid stage (3–7 days) and late stage (> 7 days).

Data entry and cleaning were performed using Microsoft Excel, and statistical analysis was conducted using IBM SPSS V20. Descriptive analysis was done calculating frequencies, percentages, means, and standard deviations. Bar and pie chart were used for graphical representation of the data. Chi-square test was used to assess associations between categorical variables, and if the expected count less than five, Fisher Exact test was used. A P value less than 0.05 was considered statistically significant using a two-tailed test.

Results

A total of 123 SHAPU cases that presented in 2015 and 2016 outbreak period (100 cases in 2015 and 23 in 2016) were included in the study. Demographic data have been published previously.

Anterior Segment Findings

Lid swelling ($p = 0.027$), presence of hypopyon ($p < 0.001$), fibrinous exudates in the anterior chamber ($p = 0.002$) and abnormalities of iris ($p = 0.018$) were significantly associated with the duration of symptoms. Lid swelling was more common in early ($n = 12$, 36.4%) and mid presentations ($n = 20$, 33.3%) and less frequent in late presentation ($n = 3$, 10%). Similarly, hypopyon (90.9% in early, 78.3% in mid) and fibrinous exudates (75.8% in early, 76.7% in mid) were seen more frequently in cases presenting within the first week of symptom onset. These were found less common in cases presenting after 7 days (hypopyon: 30%, fibrinous exudates: 40%).

Grading of presenting visual acuity ($p = 0.739$), circumciliary congestion ($p = 0.872$), anterior chamber cell grade ($p = 0.145$), pupillary status after cycloplegia ($p = 0.949$), intraocular pressure ($p = 0.366$), corneal status ($p = 0.427$), and specific corneal abnormalities ($p = 0.336$) were not significantly associated with duration of symptoms at presentation presented in Table 1.

Table 1
Anterior segment findings of SHAPU eye based on duration of symptoms at presentation

Category	Stages of SHAPU based on duration of symptoms (days)				p value
	Total	Early (Upto 2)	Mid (3 to 7)	Late (> 7)	
n (%)	n (%)	n (%)	n (%)		
Presenting Visual Acuity (PVA)					
Could not be measured	41 (33.3)	10 (30.3)	18 (30)	13 (43.3)	0.449
Measured	79 (64.2)	23 (69.7)	39 (65)	17 (56.7)	
Fixes and follows light	3 (2.4)	0 (0)	3 (5)	0 (0)	
If measured, PVA Types					
Normal to Mild *VI (6/6 to 6/18)	1 (1.3)	0 (0)	1 (2.6)	0 (0)	0.739
Moderate to Severe *VI (< 6/18 to 3/60)	9 (11.4)	4 (17.4)	3 (7.7)	2 (11.8)	
Blind (< 3/60 to NPL)	69 (87.3)	19 (82.6)	35 (89.7)	15 (88.2)	
Lid swelling					
Present	35 (28.5)	12 (36.4)	20 (33.3)	3 (10)	0.027
Absent	88 (71.5)	21 (63.6)	40 (66.7)	27 (90)	
Circumciliary congestion (CCC)					
Present	117 (95.1)	32 (97)	57 (95)	28 (93.3)	0.872
Absent	6 (4.9)	1 (3)	3 (5)	2 (6.7)	
Anterior chamber cells					
Could not be assessed	37 (30.1)	10 (30.3)	13 (21.7)	14 (46.7)	0.054
Assessed	86 (69.9)	23 (69.7)	47 (78.3)	16 (53.3)	
Anterior chamber cell grade (SUN)					
Grade 2	2 (2.3)	0 (0)	1 (2.1)	1 (6.3)	0.145
Grade 3	6 (7)	1 (4.3)	2 (4.3)	3 (18.8)	
Grade 4	78 (90.7)	22 (95.7)	44 (93.6)	12 (75)	
Hypopyon					

Category	Stages of SHAPU based on duration of symptoms (days)				p value
	Total	Early (Upto 2)	Mid (3 to 7)	Late (> 7)	
n (%)	n (%)	n (%)	n (%)		
Present	86 (69.9)	30 (90.9)	47 (78.3)	9 (30)	< 0.001
Absent	37 (30.1)	3 (9.1)	13 (21.7)	21 (70)	
Fibrinous exudate in anterior chamber					
Present	83 (67.5)	25 (75.8)	46 (76.7)	12 (40)	0.002
Absent	40 (32.5)	8 (24.2)	14 (23.3)	18 (60)	
Pupillary status (after cycloplegic)					
Fully dilated	16 (13)	4 (12.1)	8 (13.3)	4 (13.3)	0.949
Mid-dilated	37 (30.1)	11 (33.3)	16 (26.7)	10 (33.3)	
Constricted (secluded)	68 (55.3)	18 (54.5)	35 (58.3)	15 (50)	
Festooned	2 (1.6)	0 (0)	1 (1.7)	1 (3.3)	
Intraocular pressure (IOP)					
Measured	117 (95.1)	33 (100)	56 (93.3)	28 (93.3)	0.363
Could not be measured	6 (4.9)	0 (0)	4 (6.7)	2 (6.7)	
Intraocular pressure grading					
Severe Hypotony (1–5 mmHg)	6 (5.1)	2 (6.1)	2 (3.6)	2 (7.1)	0.366
Mild Hypotony (6–9 mmHg)	34 (29.1)	8 (24.2)	17 (30.4)	9 (32.1)	
Normal (10–21 mmHg)	61 (52.1)	17 (51.5)	33 (58.9)	11 (39.3)	
OHT (> 21 mmHg)	16 (13.7)	6 (18.2)	4 (7.1)	6 (21.4)	
IOP If could not be measured by tonometry					
Digitally hard	2 (33.3)	0 (0)	2 (50)	0 (0)	0.600
Digitally normal	3 (50)	0 (0)	2 (50)	1 (50)	
Digitally soft	1 (16.7)	0 (0)	0 (0)	1 (50)	
Corneal findings					
Documented	119 (96.7)	31 (93.9)	59 (98.3)	29 (96.7)	0.570

Category	Stages of SHAPU based on duration of symptoms (days)				p value
	Total	Early (Upto 2)	Mid (3 to 7)	Late (> 7)	
n (%)	n (%)	n (%)	n (%)		
Not documented	4 (3.3)	2 (6.1)	1 (1.7)	1 (3.3)	
If documented, finding of cornea					
Clear/Normal	66 (55.5)	17 (54.8)	30 (50.8)	19 (65.5)	0.427
Abnormal	53 (44.5)	14 (45.2)	29 (49.2)	10 (34.5)	
Abnormalities of cornea					
Epithelial defect/Scratches	11 (20.8)	2 (14.3)	4 (13.8)	5 (50)	0.336
epithelial edema	2 (3.8)	1 (7.1)	1 (3.4)	0 (0)	
Epithelial edema	3 (5.7)	1 (7.1)	1 (3.4)	1 (10)	
SPK	9 (17)	3 (21.4)	5 (17.2)	1 (10)	
Stromal edema / infiltration	28 (52.8)	7 (50)	18 (62.1)	3 (30)	
Iris					
Assessed	113 (91.9)	31 (93.9)	54 (90)	28 (93.3)	0.836
Could not be assessed	10 (8.1)	2 (6.1)	6 (10)	2 (6.7)	
If assessed, findings of iris					
Normal	53 (46.9)	17 (54.8)	24 (44.4)	12 (42.9)	0.108
Abnormal	46 (40.7)	7 (22.6)	25 (46.3)	14 (50)	
Not Visible	14 (12.4)	7 (22.6)	5 (9.3)	2 (7.1)	
Abnormalities of Iris					
Loss of pattern + hyperchromic	30 (65.2)	3 (42.9)	14 (56)	13 (92.9)	0.018
Loss of pattern + normochromic	16 (34.8)	4 (57.1)	11 (44)	1 (7.1)	

Note: VI: visual impairment

Posterior Segment Findings

Vitreous echodensity on B-scan ($p = 0.006$), RCS complex thickening ($p = 0.012$), and the type of fundal glow observed ($p < 0.001$) showed significant association with duration of symptoms. In early presentation, minimal echodensity was more commonly observed ($n = 20$, 69%). In mid and late stage, moderate echodensity was more commonly observed (mid: 49%, late: 60.7%). RCS complex thickening were more frequent in mid stage ($n = 37$, 68.5%), followed by late stage ($n = 16$, 57.1%), followed by early stage ($n = 10$, 34.5%). In early stage, bright red fundal glow was more common ($n = 12$, 66.7%) than leucocoria ($n = 2$, 11%), while in mid and late stages leucocoria was seen in significant number of cases ($n = 25$, 65.8%, and $n = 15$, 62.5% respectively).

Fundus visibility ($p = 0.382$), need of performance of B-scan ultrasonography ($p = 0.775$), distribution of vitreous echodensity on B-scan ($p = 0.074$), availability of echodensity assessment ($p = 0.513$), and assessment of the retinochoroidoscleral (RCS) complex ($p = 0.796$) were not significantly associated with duration of symptoms shown in Table 2.

Table 2
Posterior segment findings of SHAPU eye based on duration of symptoms at presentation

Category	Stages of SHAPU based on duration of symptoms (days)				p value
	Total	Early (Upto 2)	Mid (3 to 7)	Late (> 7)	
n (%)	n (%)	n (%)	n (%)		
Vitreous opacity grade - clinical (gradable in 39 eyes; overall only)					
Grade 0	2 (1.6)	-	-	-	-
Grade 1	3 (1.6)	-	-	-	
Grade 2	4 (3.3)	-	-	-	
Grade 3	9 (7.3)	-	-	-	
Grade 4	22 (17.9)	-	-	-	
Fundus visibility					
Visible	8 (6.5)	4 (12.1)	3 (5)	1 (3.3)	0.382
Just Visible	6 (4.9)	1 (3)	2 (3.3)	3 (10)	
Not Visible	109 (88.6)	28 (84.8)	55 (91.7)	26 (86.7)	
B-scan					
Done	112 (91.1)	29 (87.9)	55 (91.7)	28 (93.3)	0.775
Not Done	11 (8.9)	4 (12.1)	5 (8.3)	2 (6.7)	
B-scan - vitreous echodensity					
Nil (Clear)	2 (1.8)	1 (3.4)	1 (1.8)	0 (0)	0.006
Minimal echodensity	45 (40.2)	20 (69)	17 (30.9)	8 (28.6)	
Moderate echodensity	50 (44.6)	6 (20.7)	27 (49.1)	17 (60.7)	
Dense echodensity	15 (13.4)	2 (6.9)	10 (18.2)	3 (10.7)	
*B-scan - distribution of echodensity					
*data on distribution of vitreous echodensity was not found in 2 patients, ° Leucocoria was Greenish white in 9 cases (in Early-0, Mid-5, Late- 4)					

Category	Stages of SHAPU based on duration of symptoms (days)				p value
	Total	Early (Upto 2)	Mid (3 to 7)	Late (> 7)	
n (%)	n (%)	n (%)	n (%)		
Retrolental	36 (32.7)	15 (53.6)	13 (24.1)	8 (28.6)	0.074
Preretinal	11 (10)	2 (7.1)	5 (9.3)	4 (14.3)	
Diffused	39 (35.5)	4 (14.3)	24 (44.4)	11 (39.3)	
Retrolental+preretinal	24 (21.8)	7 (25)	12 (22.2)	5 (17.9)	
B-scan - retinochoroidoscleral (RCS) complex					
Normal	48 (43.2)	19 (65.5)	17 (31.5)	12 (42.9)	0.012
Thickened	63 (56.8)	10 (34.5)	37 (68.5)	16 (57.1)	
Fundal glow					
Assessable	80 (65.0)	18 (54.5)	38 (63.3)	24 (80.0)	0.099
Not assessable (due to corneal haze or FM over pupil)	43 (35.0)	15 (45.5)	22 (36.7)	6 (20.0)	
If assessable, details					
Normal (Bright Red)	23 (28.8)	12 (66.7)	8 (21.1)	3 (12.5)	< 0.001
Dull Reflex (Dull Red)	12 (15.0)	4 (22.2)	4 (10.5)	4 (16.7)	
Absent	3 (3.8)	0 (0.0)	1 (2.6)	2 (8.3)	
°White reflex (Leucocoria)	42 (52.5)	2 (11.1)	25 (65.8)	15 (62.5)	
*data on distribution of vitreous echodensity was not found in 2 patients, ° Leucocoria was Greenish white in 9 cases (in Early-0, Mid-5, Late- 4)					

Vitreous Tap Findings

Vitreous samples showed a significant association with duration of symptoms ($p < 0.001$). Colorless vitreous samples were found significantly more often in patients in early stage (78.8%). It was reduced to

39% in patients with mid stage and to 26.7% in patients with late stage. The vitreous culture positivity rate ($p = 0.883$), bacterial isolate profile among culture-positive cases ($p = 0.250$) did not differ significantly on duration of symptoms shown in Table 3.

Table 3
Vitreous tap findings of SHAPU eye based on duration of symptoms at presentation

Category	Stages of SHAPU based on duration of symptoms (days)				p value
	Total	Early (Upto 2)	Mid (3 to 7)	Late (> 7)	
n (%)	n (%)	n (%)	n (%)		
Method of vitreous sample collection					
26G needle	47 (38.2)	-	-	-	-
23G needle	55 (44.7)	-	-	-	
23G vitreous cutter	14 (11.4)	-	-	-	
Not mentioned	7 (5.7)	-	-	-	
Vitreous culture result					
Growth (positive)	49 (39.8)	13 (39.4)	25 (41.7)	11 (36.7)	0.250
No growth	74 (60.2)	20 (60.6)	35 (58.3)	19 (63.3)	
Bacterial isolates					
Staphylococcus aureus	9 (18.4)	5 (38.5)	3 (12)	1 (9.1)	0.250
Streptococcus pneumonia	35 (71.4)	7 (53.8)	20 (80)	8 (72.7)	
*Miscellaneous	5 (10.2)	1 (7.7)	2 (8)	2 (18.2)	
Vitreous biopsy colour / appearance					
Colorless	57 (46.7)	26 (78.8)	23 (39)	8 (26.7)	< 0.001
Milky	13 (10.7)	3 (9.1)	9 (15.3)	1 (3.3)	
Straw colored	18 (14.8)	2 (6.1)	10 (16.9)	6 (20)	
Greenish yellow	26 (21.3)	2 (6.1)	15 (25.4)	9 (30)	
Purulent	8 (6.6)	0 (0)	2 (3.4)	6 (20)	
*Miscellaneous: 1 each of Citrobacter fruendii, Pseudomonas aeruginosa, Gram positive bacilli, Staphylococcus epidermidis and Streptococcus viridans					

Figure 1 shows that the hair follicles / setae were absent in the majority of cases (85.2%), while only 14.8% of cases showed its presence. Figure 2 shows that the most common site of their presence was

corneal epithelium (75.0%) followed by conjunctiva, corneal mid-stroma and anterior vitreous face (in 8.3% cases each).

Discussion

In 2009-10 outbreak report from TIO, 37/66, 56% presented before and 29/66, 44% presented after 7 days respectively.[3] In this outbreak, only 30/123, 24.4% presented after 7 days. This reflects the increased level of awareness about the disease in the community.

Significant pain has been reported by majority of cases. SHAPU has been called a painless or a minimally painful disease.[5, 11] With this finding, now it is confirmed that SHAPU is a significantly painful disease. Crying and irritability is another symptom of SHAPU reported for the first time. This symptom also referred towards the painful condition in pre-verbal SHAPU children. Burning sensation is also another symptom reported for the first time. Although we could report this symptom in few cases only it could be high since children were not able to explain their symptoms, and that the majority of cases were children in the study. This symptom can be presumed to be the effect of some toxin of moth setae on the cornea.

In the report on previous outbreak in 2009-10, 94% (n = 62/66) cases had vision < 3/60-NPL at presentation. [3] It came down to 56% (n = 69/123) in this outbreak. However, vision could not be assessed in 41/123 (33%) cases since these patients were in pre-verbal age. But even if we assume that those 33% cases also had < 3/60 vision, the number of patients in this unilateral blindness condition is less than the previous report. This improvement could be due to more number of patients presenting early. Lid swelling is reported for the first time. Regarding corneal findings, after our first reporting on altered corneal sensation and corneal edema in 23% SHAPU cases, [3] the research has given further details corneal details for the first time. The epithelial defects and the scratches can be the result of corneal contact with some toxins of the moth setae. The presence of moth setae (n = 12/123, 9.75%) in ocular structures in this outbreak is higher than in the previous outbreak report (7.6%).[3] But it could still have been missed in children who did not allow slit lamp examination.

Hypopyon is one of the strong signs of SHAPU, found in 70% of cases at presentation. This is higher than the previous outbreak report (56%). Of the 37/123 (30%) cases who did not have hypopyon at presentation, 12 (9.75%) had paper documentation of hypopyon done elsewhere. So actual number of cases with hypopyon was 98 (79.6%). So, the possibility of SHAPU cannot be ruled out based on the absence of hypopyon at presentation. There is almost 90% chance of its presence in the early stage and only 30% chance of its presence in the late stage.

Fibrinous exudates in the AC is another strong signs of SHAPU (present in 67.5% of cases). It is present in nearly 76% of the cases in early stage and which drops down to only 40% in late stage.

Dark colored iris, which was historically described as muddy iris,[11] was seen in this outbreak in only 24.4% cases. The details of iris changes in SHAPU cases are being described in detail for the first time

here.

Again, Although SHAPU had been historically described as having white reflex (leucocoria) in red eye,[11] many SHAPU cases in fact presented with red reflex during this outbreak. It mostly reflects the duration of the disease. In the early stage patients are more likely to present with bright red reflex/glow (36.4% chances), where as in the late stage they are more likely to present with white or greenish white reflex/glow (13% and 36.7% chances respectively). The fact that 2 (6%) of the cases in this series presented with white reflex even in the early stage tells us about the aggressive nature of SHAPU. However, this series showed that due to the blockage of the view of the posterior segment by the fibrinous membrane across the pupil, this reflex/glow from the fundus could not be appreciated mostly in the early stage (45.5% possibility in the early stage and only 20% in the late stage). This finding tells us that the presence of bright red fundal glow or our inability to assess fundal glow should not deter us from making the clinical diagnosis of SHAPU/SE and from acting promptly, rather than waiting for the leucocoria to set in.

Around half of the outbreak cases had normal IOP (10–21 mm of Hg) in a past report which is similar to the finding this time. Regarding the staging of the disease, for the first time, we are able to report based on the actual data from the outbreak cases. In the past, the classification was given based on the experience of a group of ophthalmologists who treated SHAPU cases.[12]

In that article, the disease was described based the time of presentation and its severity as early stage/mild SHAPU, late stage/moderate SHAPU and advance stage/severe SHAPU when they present within 2 days, within 3–7 days and after 7 days of onset of symptoms respectively. So, those stages are equivalent to early, mid and late stages respectively of this study. For the sake of eliminating confusion, we are going to mention previous early and our early stage as first stage, the previous late and our mid stage as second stage and previous advance and our late stage as third stage in the subsequent discussion.

In the SHAPU classification paper, hypopyon was mentioned to be absent in the first stage cases. In this paper we are able to specify the percentage of cases with and without hypopyon. And it is found to be present in the highest number of (91%) cases in the first stage when compared to second and third stages. It was mentioned to be always present in the third stage SHAPU. But our report showed lesser chances (only 30%) of hypopyon in the third stage.

In that paper the severity of SHAPU is described to be determined only by the duration of symptoms at presentation. Unlike in that paper in which it is mentioned that the first stage SHAPU cases will have minimal ac reaction, in this series we found that the majority (67%) of the cases in this stage had grade 4 cellular reactions, and vision was < 3/60-NPL in 58% eyes [same as that in second stage and even higher than in third stage (50%)]. The presence of bacteria in the vitreous cavity as high as 39.4% eyes even in the first stage, which is higher than in the third stage (36.7%) is another striking finding. So the severity of the disease is proven not to be based strictly on the time on the presentation.

Our finding of the pupillary reflex/fundal glow in the SHPAU cases is different from those described in the paper on classification of SHAPU. Unlike in that article in which cases in the first stage are described to have normal pupillary reflex, cases in the second stage with $\pm$ leucocoria and the cases in third stage always with leucocoria, we found out that in this outbreak 11% of early cases had leucocoria, and 10% of late cases had normal pupillary (red) reflex. Of course, majority of first stage cases (66.7%) had normal pupillary (red) reflex and the majority of third stage cases (62.5%) had leucocoria in this series.

In the SHAPU classification paper, it is mentioned that the retina of the SHAPU cases in first and second stage is normal. But in this research, it is found out that the retina was not even visible in 85% and 92% of cases in first and second stage SHAPU respectively.

Likewise, in the SHAPU classification article, it is mentioned that B-scan in the first stage SHAPU is normal, second stage SHAPU has anterior and mid vitreous echos, third stage SHAPU has anterior mid and post vitreous echo. In this research B-scan in first stage SHAPU cases was normal only in 3.4% cases. In our cases we saw that the echos were present across the vitreous cavity (diffuse distribution) in > 40% second stage SHAPU cases unlike anterior and mid vitreous echoes reported previously. And nearly 30% of third stage SHAPU case can have only anterior echos (retrolental echoes). Beside the location of the echogenic shadows in B-scan, we could report on the density of the echos and the retinochoroidoscleral complex thickness as well.

In the SHAPU classification paper, IOP is mentioned to be normal to low in the first stage SHAPU, normal, low or high in the second stage and low or high in the third stage. In this research, the first stage SHAPU, IOP is found to be normal in slight > 50% cases, low in 30% and even high in slight < 20% cases. In the second stage SHAPU, it is normal in most of the cases (in nearly 60%), low in slight > 30% and high in only around 10% cases. In the third stage SHAPU, it is more likely to be either low or normal (in around 40% each) and high in only 20% cases. This tells us that even in severe cases, we can expect normal IOP in 4/10 cases unlike in that paper and unlike the previous concept of malignant hypotony in most of the cases.[11]

An important point to be noted is that in uveitis cases, inflammation does not spread from anterior to intermediate to posterior location even if there is delay in treatment. So, anterior uveitis will not convert to panuveitis if not treated. Only complications of anterior uveitis can occur in such situation. On the other hand, endophthalmitis cases worsens from only predominantly anterior involvement to posterior involvement if not timely treated. The way the clinical condition rapidly progress from seemingly hypopyon anterior uveitis to diffuse inflammation within few days strongly hints to the fact that this is endophthalmitis we are dealing with, not panuveitis. According to the article on metastatic endophthalmitis, the early stage of this disease can be called the anterior diffuse endophthalmitis and the late stage can be the posterior diffuse endophthalmitis.[15]

Conclusions

The clinical features of SHAPU are more suggestive of endophthalmitis than panuveitis. SHAPU proven to be a painful disease. The severity of the disease is not fully dependent on the time of presentation. Even the cases in the early stage can have severe inflammation/infection. So, rather than defining the severity of the disease as mild moderate or severe based on the time of presentation, we have to define it based on the clinical findings of each case when they present. This will give the better guideline to the ophthalmologist who are dealing with SHAPU.

Declarations

Ethics approval and consent to participate:

Ethical approval was granted from the Tilganga Institute of Ophthalmology-Institutional Review Committee (Ref: 04/2018). The study was conducted in accordance with the Declaration of Helsinki. Since, this is retrospective study and data was taken from electronic medical record of the hospital, so patients' consent was waived.

Consent for publication:

Not Applicable

Competing interests:

No

Funding:

No

Author Contribution

AM conceptualized and designed the study, provided overall guidance and supervision, and led the project. SS contributed to data acquisition and assisted in manuscript preparation. PB was involved in data collection, data management, and assisted in manuscript preparation. MP conducted the statistical analysis, managed the submission process, and assisted in drafting and revising the manuscript. All authors reviewed and approved the final manuscript.

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Data Availability

The dataset analyzed during the current study is not publicly available due to patient privacy and institutional confidentiality policies, but will be available from the corresponding author on reasonable request.

References

1. Manandhar A. Seasonal hyperacute panuveitis: an update. *Curr Opin Ophthalmol*. 2011;22:496–501.
2. Byanju RN, Pradhan E, Rai SC, Sapkota YD. Visual outcome of vitrectomy in seasonal hyperacute panuveitis. *Kathmandu Univ Med J (KUMJ)*. 2003;1:121–3.
3. Manandhar A, Margolis TP, Khanal B, Nep. *J Oph*. 2018;10:23–31.
<https://doi.org/10.3126/nepjoph.v10i1.21684>.
4. Malla OK. Endophthalmitis probably caused by Tussock moth. In: *Proceedings of the First National Seminar on Prevention of Blindness*; Kathmandu. Nepal: Organizing Committee of the First National Seminar on Prevention of Blindness; 1978.
5. Upadhyay M, Kharel Sitaula R, Shrestha B, Khanal B, Upadhyay BP, Sherchand JB, et al. Seasonal Hyperacute Panuveitis in Nepal: A Review over 40 Years of Surveillance. *Ocul Immunol Inflamm*. 2019;27:709–17. <https://doi.org/10.1080/09273948.2018.1439643>.
6. Shrestha E. A profile and treatment outcome of seasonal hyper-acute panuveitis. *Nep J Oph*. 2010;2:35–8. <https://doi.org/10.3126/nepjoph.v2i1.3702>.
7. Tamang S, Jayanna S, Tshering SC, Zangmo U, Powdyel A, Dorji P, et al. Seasonal Hyperacute Panuveitis (SHAPU) in Bhutan. *Ocul Immunol Inflamm*. 2024;32:203–9.
<https://doi.org/10.1080/09273948.2022.2164512>.
8. Rai BB, Morley MG, Bernstein PS, Maddess T. Pattern of vitreo-retinal diseases at the national referral hospital in Bhutan: a retrospective, hospital-based study. *BMC Ophthalmol*. 2020;20:51.
9. Upadhyay MP, Kharel Sitaula R, Manandhar A, Gower EW, Karki P, Gurung H, et al. The Risk Factors of Seasonal Hyperacute Panuveitis. *Ophthalmic Epidemiol*. 2021;28:250–7.
<https://doi.org/10.1080/09286586.2020.1820533>.
10. Khanal B, Shrestha BR. Diversity, distribution and medical significance of *Gazalina* species (Lepidoptera: Notodontidae) in Nepal. *Nepal J Zool*. 2022;6:45–9.
11. Upadhyay MP, Rai NC, Ogg JE, Shrestha BR. Seasonal hyperacute panuveitis of unknown etiology. *Ann Ophthalmol*. 1984;16:38–44.
12. Kharel Sitaula R, Khatri A, Karki P, Joshi SN, Gurung H, Shrestha E, et al. Classification of Seasonal Hyperacute Panuveitis (SHAPU). *Ocul Immunol Inflamm*. 2022;30:1751–5.
<https://doi.org/10.1080/09273948.2021.1944646>.

13. Standardization of Uveitis Nomenclature (SUN) Working Group. Standardization of Uveitis Nomenclature for Reporting Clinical Data. Results of the First International Workshop. American Journal of Ophthalmology. 2005;140:509–16. <https://doi.org/10.1016/j.ajo.2005.03.057>
14. Manandhar A, Shrestha S, Poudel M, Banjara P, Oli RU. Treatment patterns, outcomes and its associated factors among seasonal hyper-acute panuveitis cases in one of the largest outbreaks: a hospital-based retrospective study from Nepal. BMC Ophthalmol. 2025;25:511.
15. Greenwald MJ, Wohl LG, Sell CH. Metastatic bacterial endophthalmitis: a contemporary reappraisal. Surv Ophthalmol. 1986;31:81–101. [https://doi.org/10.1016/0039-6257\(86\)90076-7](https://doi.org/10.1016/0039-6257(86)90076-7).

Figures

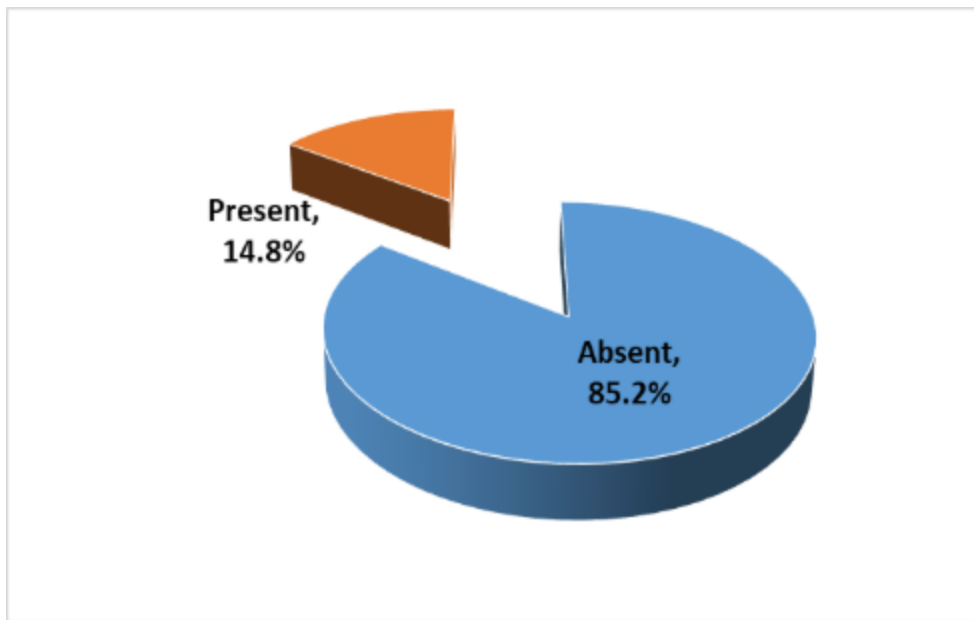


Figure 1

Hair follicle / setae presence (n=81)

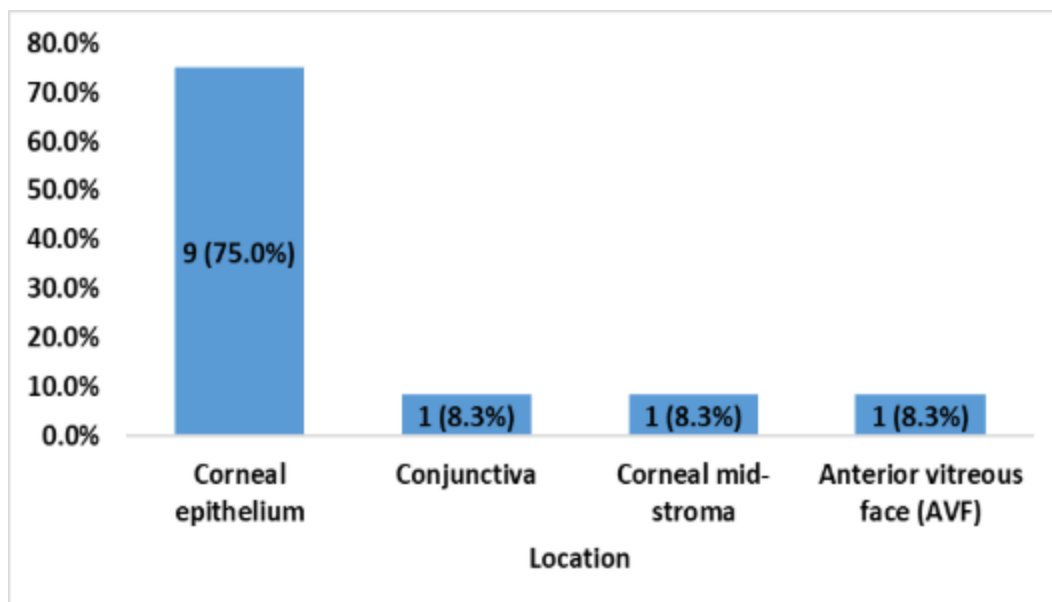


Figure 2

Location of moth setae (if present, n=12)