PADDY GRAIN INJURY OF THE EYE*†

A STUDY OF 277 CASES

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PADDY grain injury of the eye (known as "harvest ulcer") is very common in Kerala State, because the peasants thresh the rice by beating the paddy stalks with sticks, so that the grains are apt to fly up in their faces (Fig. 1).

FIG. 1.—Threshing paddy stalks with sticks.

The fact that many such abrasions became infected and refractory to treatment was attributed to the introduction of a fungus. Duke-Elder (1954) mentioned that apparently trivial agricultural injuries often lead to serious visual loss through bacterial or fungal infection. This study was carried out to ascertain the infective agent, and in the course of our work we found that spiky hairs from the paddy husk (Fig. 2) sometimes lodged in the cornea. Injury by hairs from other plants has been described, but we could find no report in the literature of injury by paddy hairs.

FIG. 2.—Painting of paddy grain, showing hairs on the husk.

* Received for publication January 23, 1967.

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Material

We studied 277 patients who came to the Government Ophthalmic Hospital, Trivandrum, with a history of injury by paddy grain or leaf in the two harvest seasons (March–April and August–September, 1966). In the peak month of September we saw 111 cases (3.7 per cent. of all ophthalmic outpatients and 38.9 per cent. of all eye injuries).

Method

The lesion was examined and carefully drawn, and each patient was examined daily until healing was complete. The early lesion was a cluster of multiple tiny abrasions (Fig. 3) and some of the later cases showed multiple ulcers (Fig. 4).

FIG. 3.—Painting of an early lesion consisting of multiple punctate abrasions.

FIG. 4a.—Multiple ulcers. Three ulcers with a halo of infiltration can be seen towards the centre of the cornea.

FIG. 4b.—Painting of another case of multiple ulcers. Three healing lesions and two ulcers can be seen at 6 o'clock.

The 10 × corneal loupe and slit lamp revealed the presence in 23 cases of shining raised objects (Fig. 5, opposite) and, when the slough scraped from an ulcer 6 mm. across was viewed under the microscope, four sharp spikes were seen which proved to be detached paddy hairs (Fig. 6, opposite). Thereafter we scraped all ulcers that were large enough to be so treated without further damage to the corneal surface, and found paddy hairs in eight cases. The tiny spots containing the shining objects were not touched but were observed daily.

The specimen obtained by scraping was examined for hairs (Fig. 7, opposite). It was then air-dried and was later stained by Leishman's stain for histological study.

FIG. 5.—Painting showing slit-lamp appearance of shining objects projecting from some of the corneal abrasions.

FIG. 6.—Enlargement of paddy grain, showing four trichomes (hairs) projecting from the surface.

FIG. 7.—Photomicrograph of trichome tips obtained by scraping a large ulcer.

The corneae of four eviscerated eyes were processed and stained with haematoxylin and eosin for pathological study (Fig. 8). Periodic acid-Schiff staining did not reveal the presence of fungus.

FIG. 8.—Photomicrograph of acute inflammatory reaction in a section from a corneal ulcer. Haematoxylin and eosin.

Repeated smears and cultures for fungus were also done in the large ulcers in Sabouraud's agar. The hairs obtained by scraping were identified by the botanist, and in one case a similar injury by arrow grass (*Aristida cetacea*) was found.

Results

Cause of Injury.—Table I shows that threshing with sticks was the commonest cause of injury, but other work, like reaping, pitching weeds, or even handling hay was responsible in 49 cases. Women were more often affected in our series because threshing is a woman's job in this state. Paddy grains were the cause of injury in 213 patients, the leaf in forty, and the inflorescence in the field in 24.

TABLE I
VARIOUS CAUSES OF PADDY GRAIN INJURY IN 277 CASES

Cause of Injury	Material			Sex		Total No. of Cases
	Grain	Leaf	Inflorescence	Male	Female	
Threshing with sticks	174	14	—	43	145	188
Watching threshing	26	—	—	7	19	26
Using mechanical thresher	12	2	—	13	1	14
Reaping	—	9	20	20	9	29
Other work in the paddy field	—	8	3	3	8	11
Handling hay	1	7	1	4	5	9
Total	213	40	24	90	187	277

Previous History.—This indicates the gravity of the problem; 29 patients had had a previous injury by paddy grain, twelve of them having corneal opacities and five having lost the sight of one eye.

Case 1, a 23-year-old girl, had had a paddy grain injury in the right eye 4 years before and one in the left eye 3 years before, and both mishaps had left dense opacities in the pupillary area. She had had a keratoplasty to the right eye but she presented with a second injury to the left eye.

FIG. 9.—Photomicrograph of paddy trichomes obtained from a corneal ulcer, showing their refractile property when viewed by polarized light.

Case 2, a 31-year-old woman, had two injuries at an interval of 4 days. The ulcer in the left eye which was 6 mm. across spread further and the eye was lost. The smaller ulcer in the right eye healed with treatment.

Presenting Symptoms.—In most cases the paddy grain hit the eye and fell off immediately, but some patients closed the lids over the foreign body, which then had to be removed from the lower fornix. We had to remove the chaff in two cases but never the whole grain.

The variety of symptoms was striking, some patients with trivial abrasions complaining of severe pain and photophobia, while others with similar or larger ulcers experienced little discomfort. The presenting symptoms are listed in Table II (opposite), and illustrated by Figs 3–5 (above).

TABLE II
PRESENTING SIGNS IN 273 CASES

Type and No. of Lesions			No. of Cases	Mean No. of Days after Injury
Multiple Punctate Abrasions		1	18 24 9 3 } 54	2·2
		2-4		
		5-9		
		10+		
Linear Abrasion			8	2·1
Ulcer	1-2 mm.	1	75 9 1 2 9 } 96	3·1
		2		
		3		
		4		
		With spots		
	2-5 mm.	Confluent Circular	8 28 } 36	4·4
	5-8 mm.		10	5·7
	Involving whole cornea		7	9·0
Conjunctival Lesion	Mild localized Mild generalized Subconjunctival haemorrhage		9 18 2 } 29	4·2
Healed Corneal Lesion			17	9·0
No Lesion			16	—
Total			273	

The shining raised objects in some of the spots are seen with the slit lamp to be refractile bodies projecting from the cornea. Their appearance under the microscope is shown in Fig. 9 (opposite). Table III shows the number of shining objects seen in different cases; in the larger ulcers these refractile bodies were covered by the slough, and were found by scraping.

TABLE III
SHINING HAIRS SEEN IN 31 CASES

Number of Hairs	1	2	3	4	5 or More	Total Cases
Seen on cornea through the slit lamp	9	8	1	3	2	23
Seen in scrapings with the microscope	5	0	2	1	0	8

Course of the Lesion (Table IV, overleaf).—95 per cent. of small ulcers less than 2 mm. across healed without spreading, but the larger ulcers were more difficult to control. In some cases repeated scraping checked their progress, and others responded to subconjunctival antibiotics, but many caused anterior staphyloma, or led to evisceration of the eye. The shining hairs could not be washed away and persisted until they were expelled spontaneously (Table V, overleaf). The mean healing time was 2.6 days when these shining hairs were absent and 6.5 days when they were present. Apart from this delay in healing they did not appear to cause any reaction such as keratitis or iritis.

Table VI (overleaf) summarizes the extent of visual damage at the time of discharge.

TABLE IV
COURSE OF THE LESION IN 178 CASES FOLLOWED

Presenting Signs		No. of Cases Followed-up	Result (per cent.)		
			Healed without spreading	Spread controlled	Spread uncontrolled and eye lost
Multiple Abrasions		50	96	4	0
Ulcer	1-2 mm.	80	95	5	0
	2-5 mm.	32	65·6	18·7	15·6
	5-8 mm.	9	0	33·3	66·6
	Whole cornea	7	0	0	100

TABLE V
DELAY IN HEALING OF MULTIPLE SPOTS CONTAINING HAIRS

Days taken for healing after injury	1-2	3-5	6-10	10 or More	Total No. of Cases	Mean Healing time
Shining objects seen	2	8	11	3	24	6·5
Shining objects not seen	13	8	2	0	23	2·6
Total	15	16	13	3	47	—

TABLE VI
VISION AT TIME OF DISCHARGE IN 277 CASES

Visual Acuity	6/6 to 6/12	6/18 to 6/60	6/60 or less	No Perception of Light	Total
No. of Cases	168	74	20	15	277

The Hairs.—These are sharp conical spikes, and are highly refractile when viewed by polarized light. The surface of the glumes (husk) is covered with single or multiple-cell stiff obliquely-directed tapering trichomes, each raised on a pad or cushion made up of adjoining epidermal elements. They are not easily detachable but the multicellular type may break across so that the terminal cell is left in the cornea.

Mycological Study.—Saprophytic fungi grew in a few tubes, but these were probably contaminants because the same fungus was not grown repeatedly from any ulcer.

Pathological Study.—Smears from Leishman-stained ulcers showed necrotic epithelial cells and neutrophilic leucocytes. There was no evidence of eosinophilic response indicating allergy. Tissue sections of the four eviscerated corneae showed an acute inflammatory reaction, with necrosis of the corneal surface and diffuse infiltration with neutrophils and lymphocytes but no hairs were identified and no fungus was present.

Discussion

Caterpillar hairs may cause a condition known as ophthalmia nodosum (Watson and Sevel, 1966; Schirmer, 1954); small greyish-yellow nodules form on the conjunctiva and cornea, and the hairs tend to migrate deeper into the anterior chamber and iris. A similar nodular conjunctivitis is also caused by chemically-irritating vegetable hairs: burdock (Hartmann, 1940), burr (Merz-Weigandt, 1919), everlasting flowers (Karbe, 1923), and thistle-down (Jakowlewa, 1924). Mesquite thorn injuries of the cornea heal imperfectly because they contain an irritant wax, cerotic acid (Brunner and Bieberdorf, 1950). Perforating injury by aloe barbs causes severe exudative iridocyclitis (Sedan and Rouher, 1956). Other vegetable structures, like the spines of the sweet chestnut husk are well tolerated and are usually extruded spontaneously (Klainguti, 1948; del Buono and Lampis, 1962). No report of injury by paddy hairs was found in the literature, but two other types of injury by grains are described by Duke-Elder (1954): a grain of corn may be retained in the upper fornix for several weeks producing a granuloma resembling the cockscomb type of tuberculosis, and the concave surface of seed husks may adhere to the limbus for several days causing only minimal symptoms.

Summary and Conclusions

A study was made of 277 cases of eye injury caused by paddy grains flying up when rice was threshed with sticks. The early lesion appeared as a cluster of tiny corneal abrasions caused by the multiple spiky hairs of the paddy husk. In 23 cases these hairs lodged in the cornea and were seen with the slit lamp as shining raised objects. In eight cases paddy hairs were seen with the microscope in scrapings from corneal ulcers. Some large ulcers were refractory to treatment, but we were unable to find any fungus infection and the severe ulceration was most likely due to neglect and lack of hygiene. Our conclusion is that these hairs are well tolerated by the cornea, and that clean early lesions may be treated conservatively until the hairs are expelled spontaneously. If a larger ulcer develops its progress may be checked and healing promoted by scraping the slough.

I wish to thank Dr. K. S. Subramaniam, professor of ophthalmology and superintendent of the Government Ophthalmic Hospital, Trivandrum, for permission to carry out this investigation, Dr. P. Ramachandran, assistant professor of pathology, and Dr. K. Sivarajan, assistant professor of bacteriology, the Medical College, Trivandrum, Mrs. Esther Hallegua, professor of botany, University College, Trivandrum, and Dr. P. T. Joseph, reader in chemistry, Kerala University, for their help.

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