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Case Report

Calotropis induced ocular toxicity

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Introduction

Calotropis procera (Fig. 1) belonging to Asclepiadaceae family grows generally in desert areas and is ubiquitous across Rajasthan. It is however also seen in other states of India. It is called Ak in Hindi and Akonda in Bengali and also known as Sodom apple or Madar shrub. It produces copious amounts of thick milky sap which profusely exudes out on breaking the leaves or stalk of the plant. Troops moving across the desert during various manoeuvres frequently encounter this plant. This was particularly seen in the recent routine exercise when troops accidentally went over these plants in fast moving vehicles during night mobilization leading to splashing of the milky sap all around. A series of 16 cases of *Calotropis* induced ocular toxicity occurring within a span of 3 weeks are being reported in this report. All patients underwent complete examination including visual acuity assessment, slit lamp examination, fundus evaluation, tonometry and fluorescein staining. Pachymetry and specular microscopy was carried out in two cases to confirm presence of corneal oedema and evaluate endothelial cell count and morphology.

Case report

A 27 year old patient reported with *Calotropis* plant milky sap drop entering into his left eye accidentally. He developed an immediate burning sensation, redness of eyes and photophobia. He washed the eyes thoroughly after which the burning improved but his vision slowly reduced over a period of 2 h. The next morning he reported to the medical officer who referred him to the ophthalmologist. On evaluation at the eye centre he complained of diminution of vision. There was no pain.

Ocular examination revealed visual acuity in right eye was 6/6 and in left eye was 6/12. Right eye was normal. Left eye mild conjunctival congestion was present. Cornea showed normal epithelium and stroma. Descemet's membrane folds were present suggestive of corneal oedema (Fig. 3). There were no keratic precipitates (KPs). Anterior chamber showed no cells or flare. Iris, pupil, lens were normal. Fundus examination was normal. Intraocular pressure was 14 mmHg by non-contact tonometer in both eyes. Fluorescein staining showed conjunctival staining inferiorly in the form of a triangle with apex towards inferior limbus and base towards the inferior fornix (Fig. 4) and punctate staining over surrounding area. Pachymetry revealed that central corneal thickness in right eye was 514 microns and left eye was 545 microns. Specular microscopy showed endothelial cell count in right eye – 2907/mm² and left eye – 2689/mm². Pleomorphism and polymegathism were present in the left eye. He was treated with topical steroids, antibiotic and non-steroidal anti-inflammatory drops. He responded to the treatment. His visual acuity improved to 6/6 in two days. But conjunctival staining and Descemet's membrane folds persisted for another two days.

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Fig. 1 – *C. procera* plant.

A total of 16 such cases of accidental instillation of sap of *Calotropis* plant in patients were seen over a period of three weeks. The patient profile and clinical profile of the patients are given in [Tables 1](#) and [2](#). The common features in all cases were delayed diminution of vision over a period of 2–4 h, absence of pain after initial burning sensation, inferior conjunctival staining – in the form of a triangle with apex towards inferior limbus and base towards the inferior fornix and corneal oedema with Descemet's membrane folds. One patient had associated corneal abrasion due to mechanical rubbing of leaf of *Calotropis* plant against his cornea. All of them were treated in a similar manner as the main case except that topical steroids were withheld in the cases with epithelial defect till the defect healed. All the patients recovered fully over a period of 2–5 days to one week. The average period of recovery was 4.3 days.

Fig. 2 – Blue litmus paper turned red due to acidic nature of sap of *C. procera*.

Fig. 3 – Descemet's membrane folds caused due to toxicity of *Calotropis* sap.

Discussion

The sap of *C. procera* is acidic in reaction and turns blue litmus red ([Fig. 2](#)). On keeping for some time the latex separates into a white coagulum and clear serum. The serum is highly toxic. Gigantin a white crystalline substance isolated from the serum has been found to be 15–20 times as poisonous as strychnine.¹

Calotropis induced ocular manifestations occur because of two reasons, the first being the acidic nature of the milky sap and second due to the toxins present in the sap. The observations in our series of cases revealed that the clinical features occurred in two stages which have not been described previously in the literature though all manifestations have been reported in various reports.^{1–4}

Stage 1 – stage of acute acid injury and

Stage 2 – stage of toxicity.

Stage of acute acid injury manifests like any other chemical injury due to acid. This stage is seen in all cases that

Fig. 4 – Inferior conjunctival staining in the pattern of an inverted cone with apex towards inferior limbus and base towards the fornix.

Table 1 – Patient profile.

S. no	Patient features	Number	Percentage
1	Number of patient	16	
2	Age	24–41	
3	Gender	Males – 16	100
4	Right eye only	6	37.5
5	Left eye only	6	37.5
6	Both eyes	4	25
7	Presentation		
(a)	Within 24 h	6	37.5
(b)	24–48 h	6	37.5
(c)	After 48 h	4	25

manifest immediately with burning sensation, pain and photophobia. There is staining of cornea and conjunctiva due to epithelial defects as a result of acid injury. A very characteristic staining pattern was observed in some patients in the form of inferior conjunctival staining in the pattern of a triangle with apex towards inferior limbus and base towards the fornix (Fig. 4). This finding is being reported by us for the first time. The explanation for this is that when a drop of sap falls into the eye it tracks down and settles down in the inferior fornix causing acid injury along its path.

Stage of toxicity starts from the suppression of pain after initial burning sensation and pain which appears to be the point of demarcation between the two stages. This has also been observed in various reports.^{2–4} The next toxic effect manifests after a few hours with diminution of vision. The noticeable cause of this was corneal oedema with folds in Descemet's membrane. The finding of Descemet's membrane folds was observed in all the patients in this series and has also been reported universally in all reports in literature.^{1–4} The corneal oedema with Descemet's membrane folds appears to be the predominant feature due to the toxicity of *Calotropis* sap. It probably occurs because of toxicity to corneal endothelium. Pachymetry carried out in two cases showed

increased central corneal thickness in affected eye as compared to the normal fellow eye. Specular microscopy revealed low endothelial cell count with *pleomorphism* and *polymegathism* in affected eye as compared to normal fellow eye. Al-Mezaine et al⁵ reported permanent endothelial cell loss with morphologic alteration in their case. Basak et al² reported low endothelial cell count in 17 out of 23 eyes (74%) on specular microscopy at three months in comparison to the normal fellow eye. These findings also suggest that the cause of corneal oedema is endothelial toxicity. Clinically all patients showed full recovery of corneal oedema and visual acuity within 7 days. No cases of iridocyclitis were seen in this series. This is probably because of early institution of primary care in the form of copious irrigation of eyes reducing the load of toxins acting on the eye. Pandey et al⁴ also did not report any case of iridocyclitis in their series of 10 cases. Toxic iridocyclitis due to *Calotropis* has been reported by Tomar et al¹ and also by Basak et al.² This could occur if the quantity of sap instilled in the eye is more or if it was not immediately washed off by the patient resulting in the tracking down of toxins to anterior chamber. The sap of *C. procera* has been found to contain histamine and prostaglandins^{6,7} which may lead to iridocyclitis. None of the cases in this series had secondary glaucoma. Pandey et al⁴ and Lakhtakia et al³ also did not report any occurrence of secondary glaucoma which was reported by Basak et al² in their series. The raised intra-ocular pressure could be secondary to iridocyclitis.

C. procera plant expresses copious amount of poisonous sap on injury. The troops deployed in desert areas are exposed to this silent adversary particularly during night movement. It may lead to transient loss of varying degrees of vision in the affected eye. The ocular lesions are easily preventable by increasing the awareness and wearing protective glasses.

Conflicts of interest

All authors have none to declare.

Table 2 – Clinical profile.

S. no	Clinical features	Number of eyes	Percentage
1	Complaints		
	Pain	20	100
	Redness	20	100
	Photophobia	20	100
2	Visual acuity on presentation		
	Less than 6/60	Nil	
	6/60–6/18	4	20
	6/18–6/12	4	20
	6/12–6/9	7	35
	6/6	5	25
3	Conjunctival congestion	15	75
4	Corneal oedema with Descemet's fold	20	100
5	Epithelial defect	3	15
6	Fluorescein staining		
	(a) Conjunctiva	17	85
	(b) Cornea	4	20
7	Other features	Nil	Nil

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