

An Uncommon Case of Argemone Poisoning (Dropsy) Outbreak in a Single Family

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INTRODUCTION

Epidemic dropsy is a disease characterized by acute manifestation of bilateral pitting oedema, erythema, local tenderness, gastrointestinal disturbance along with cardio-respiratory problems and in severe cases leading to death. It results due to consumption of mustard oil contaminated with argemone oil. Argemone poisoning usually occurs in outbreaks, isolated cases are uncommon. We report a case of epidemic dropsy in a family from Saharanpur, Uttar Pradesh, during the month of March, admitted to Medical College and Hospital Chandigarh.

PRESENTATION OF CASE

Four members of a single family (self- 32 years, father- 55 years, wife- 28 years & son-12 years old) were admitted, had similar symptoms of loose motions in early course lasting for 3-4 days, progressive lower limb swelling with breathlessness and palpitation of 10 days duration. It was worth noting that these symptoms started almost simultaneously in all the family members, got admitted to a local hospital where daughter died as she had most severe symptoms. They were then referred to Medical College and Hospital, Chandigarh, for further evaluation and management. Thorough personal and medical history, history of present illness, and clinical features of each patient were noted. Clinical parameters and investigations are depicted in table 1.

	Self (32 Y)	Father (55 Y)	Wife (28 Y)	Son (12 Y)
Pulse beats/min	82	76	110	72
BP mmHg	110/80	130/84	110/74	110/70
Temp.	N	N	N	N
Pallor	+	++	++	++
Cyanosis	A	A	A	A
Jaundice	A	A	A	A
P.edema	++	++	++	++
Neck vein	engorged	engorged	engorged	Engorged

Table 1. Clinical Profile of Patients

	Self (32 Y)	Father (55 Y)	Wife (28 Y)	Son (12 Y)
Hb gm%	9.2	5.8	8.9	5.7
TLC/DLC	9200/N80L17M02E01	6000/N82L14M02E02	8000/N80L18M01E01	5600/N72L25M02E01
Platelet	1.5	1.0	2.4	1.73
MCV	106fl	109fl	-	106fl
T. Bilirubin	0.6	0.5	1.2	0.6
Alk. p	74	113	74	124
OT/PT	17/43	37/42	30/40	16/12
T. Protein/Alb	5.3/3.7	5.7/3.7	7.3/4.2	5.5/3.7
S. Na/K	142/3.2	142/4.5	143/4.4	147/4.4
Urea/creatinine	50/1.2	62/1.5	37/0.8	29/0.8
Urine	NAD	NAD	Alb +	Alb traces

Table 2. Lab Parameters of the Patients

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Family belongs to low socioeconomic status, vegetarian and agriculture being main occupation. Family had been using new mustard oil since 15 days before onset of symptoms. Consumed mustard oil was obtained from the mustard seeds cultivated from their own fields and was processed locally. None of the persons living in the neighbouring households complained of similar illness.

On Clinical examination, patient's wife had tachycardia, pallor was seen in father, son and wife. All had bilateral lower limb swelling and engorged neck veins. Bilateral basal crepitation was noted during respiratory system examination in father. (table 1).

Investigations revealed moderate anemia in self and wife, while his father and son had severe anemia of 5.8 gm/dl and 5.7 gm/dl respectively. Thrombocytopenia of 1 lakh/mm³ was note in father (table 2). Albuminuria in traces was seen in wife and son. Fundus examination showed soft exudates in left eye of father and son had bilateral superficial retinal hemorrhage. (Table 3).

	Self (32 Y)	Father (55 Y)	Wife (28 Y)	Son (12 Y)
CXR	N	N	N	N
ECG	N	N	N	N
Eye (fundus)	N	L/E-soft exudates +	N	b/l superficial retinal Haemorrhage +
2 D Echo	Mild MR	Mild MR	Borderline LVH	Mild MR
	Mild TR	Mild TR	Mild MR	Rest WNL
	Rest WNL	Rest WNL	LV DD	No RWMA
	No RWMA	No RWMA	No RWMA	EF:N
	EF:N	EF:N	EF:N	

Table 3. Investigation in Patients



Picture 1. Nitric Acid Test: 5 mL Oil is Shaken with an Equal Volume of Nitric Acid. On Standing, the Acid Layer Turns Yellow, Orange-Yellow or Crimson, Depending Upon the Amount of Argemone Oil. The Test is Sensitive to a Concentration of >0.25%.



Picture 2. Persistent Bilateral Lower Limb Swelling (Father) on 1 Week Follow Up after Discharge from Hospital

CLINICAL DIAGNOSIS

Clustering of cases and simultaneous occurrence of characteristic clinical picture in family especially in a mustard oil consuming belt nearing harvest season of mustard crop and association of symptoms with consumption of freshly processed oil were very much suggestive of a diagnosis of epidemic dropsy. However, investigations were done to rule out other fatal mimics and to grade the severity of the illness. Oil sample brought by family was tested for argemone oil contamination to confirm the diagnosis (picture 1).

DIFFERENTIAL DIAGNOSIS

Food poisoning, hypoproteinaemic states, filariasis, venous insufficiency, beriberi, hypothyroidism, nephrotic syndrome and congestive heart failure have similar clinical presentation. These differentials can be easily be defined in appropriate clinical settings and investigations. The diagnosis of epidemic dropsy must be considered during an outbreak of bilaterally symmetric oedema in more than one member of a family or community consuming mustard oil, especially if peripheral tendon jerks are well preserved. Beri-Beri occurs among poor persons living on a diet of milled rice, has an acute onset, prominent peripheral neuropathy and responds rapidly to thiamine therapy with brisk diuresis.

No laboratory parameter is considered specific for epidemic dropsy. Anaemia may be severe and is of microcytic hypochromic or normocytic normochromic type. Liver function tests are usually normal. Blood urea and creatinine may be raised if renal failure is present. Urinalysis is usually normal. Chest X-ray may show cardiomegaly, pulmonary oedema or pneumonia. Electrocardiogram may show nonspecific ST segment, and T-wave changes or atrial or ventricular extrasystoles.

PATHOLOGICAL DISCUSSION

Epidemic dropsy is a clinical state resulting from use of edible oils adulterated with Argemone Mexicana oil with which it is completely miscible.^{1,2,3,4} Sanguinarine and dehydro sanguinarine are two major toxic alkaloids of Argemone oil. Sanguinarine cause widespread capillary dilatation, proliferation and increased capillary permeability. Leakage of the protein-rich plasma component into the extracellular compartment leads to the formation of oedema. The haemodynamic consequences of this lead to a state of relative hypovolemia with a constant stimulus for fluid and salt conservation by the kidneys resulting in marked anasarca. Similar exudation of protein-rich fluid from the pulmonary capillaries in the interstitial tissues of the alveoli produces interstitial or frank pulmonary oedema of non-cardiac origin with manifestations of mild hypoxia, respiratory alkalosis, restrictive ventilatory defects, increased alveolar to arterial oxygen gradient, and

derangement of diffusion capacity. Resultant pulmonary hypertension leads to a rise in right ventricular systolic pressure as well as dilation of right-sided cardiac chambers and right-sided failure independent of left ventricular systolic function. Histopathology of the lungs reveals congestion and exudation of fluid and red cells into the alveoli. High output cardiac failure with a wide pulse pressure, tachycardia, dyspnoea, orthopnoea and gallop rhythm may result from the peripheral vasodilatory effects of sanguinarine and moderate to severe anaemia. The onset of cardiac failure, which is predominantly right-sided, further worsens oedema formation and leads to congestive hepatomegaly. Haemodynamic and vascular changes in the kidney, and possibly an additional direct effect of Argemone alkaloids, are responsible for the azotaemia and renal failure seen in some patients the diarrhoea and vomiting observed in the acute stage may be due to direct toxicity of Argemone oil to the enterocytes and congestion of the gut mucosa due to vascular leakiness. Anaemia is common and may be multifactorial in origin due to bleeding from the gastrointestinal tract, bone marrow suppression, and shortened red cell life span.⁵

Dropsy occurs in epidemics; isolated cases are seldom seen and reported.⁶ very few cases report outbreaks of epidemic dropsy restricted to a single family in the scientific literature, although the rest of the outbreaks affected more than one family.^{6,7} The reasons for this outbreak being restricted to a particular family can only be explained if the contamination of mustard seeds with argemone seeds occurred at the household level as the mustard oil was extracted from the seeds of the plants cultivated in their own land. The family was not aware of contamination of mustard seeds with that of argemone seeds, which had led to the current outbreak. Furthermore, the low socio-economic background also favours the use of home extracted oils, which has more chances of contamination.

Rather than commercially available tested pure oils. Various studies on epidemic dropsy from India also reported that most of the patients affected during epidemic dropsy outbreaks belong to low socio-economic status.⁸⁻¹⁰ In this outbreak the main clinical symptoms reported were gastrointestinal, i. e., diarrhoea and progressive lower limb swelling along with dyspnoea. Persistent tachycardia was seen in a case but without any other cardiovascular manifestations.

The suspicion of epidemic dropsy usually rests upon identification of some clinic-epidemiological features within a cluster of cases, which can then be confirmed by detection of argemone oil in mustard oil used for cooking.¹¹ Detection of Argemone oil adulteration in edible oils, the following tests are useful¹²⁻

Nitric Acid Test - This test is sensitive to a concentration of >0.25% (picture 1).

Ferric Chloride Test - 2 ml of oil and 2 ml of concentrated hydrochloric acid are mixed and heated in a water bath at 33.5-35°C for 2 minutes. Then 8 ml of ethyl alcohol is added and the mixture is heated in the bath for 1 minute. Finally, 2 ml of ferric chloride is added and the tube

is heated in the bath for a further 10 minutes. If Argemone oil is present, an orange-red precipitate is formed.

Paper Chromatographic Method - The most sensitive method; can detect down to 0.0001% Argemone oil adulteration.

DISCUSSION OF MANAGEMENT

The most important initial step is to withdraw contaminated cooking oil. Bed rest with leg elevation and a protein-rich diet are useful. Supplements of calcium, antioxidants (vitamin C and E) and thiamine and other B vitamins are commonly used. Corticosteroids and antihistaminics such as promethazine have been advocated by some investigators,¹³ but demonstrated efficacy is lacking. Diuretics are used universally but caution must be exercised not to deplete the intravascular volume unless features of frank congestive cardiac failure are present, as oedema is mainly due to increased capillary permeability. Cardiac failure is managed by bed rest, salt restriction, digitalis and diuretics. Pneumonia is treated with appropriate antibiotics. Renal failure may need dialysis therapy and complete clinical recovery is seen. Glaucoma may need operative intervention, but generally responds to medical management. Mortality is usually due to heart failure, pneumonia, respiratory distress syndrome or renal failure and is around 5%. Long-term follow-up studies are scanty so the long-term effects of Argemone oil toxicity have not been documented. Wadia et al reported that 25% of cases will have oedema beyond 2 months and 10% beyond 5 months.¹⁴ the majority of patients completely recover in about 3 months. The patients in this case report initially presented with gastrointestinal symptoms and being clustered to a single family, local hospital treated symptomatically as an outbreak of food poisoning/gastrointestinal illness and the epidemic dropsy was missed. Hence, there is a need to make physicians aware that the differential diagnosis of epidemic dropsy has to be kept in mind, especially if there is a cluster of cases of repeated gastrointestinal illness within a family or neighbourhood in a mustard oil consuming belt, for early diagnosis and prevention of deaths and disability among the affected members.

FINAL DIAGNOSIS

Considering the appropriate clinical setting, high index of suspicion and detection of argemone oil in mustard oil used for cooking a final diagnosis of epidemic dropsy was made.

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