Journal of Emergency Medicine and Care
Volume 6 | Issue 1
ISSN:2639-9253

Case Report Open Access

Ricinine Toxicity Presenting as Acute Flaccid Paralysis

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Citation: Razia Adam Kadwa, Zahid Kareem, Shruti Saxena (2023) Ricinine Toxicity Presenting as Acute Flaccid Paralysis.J Emerg Med Care 6(1) : 104.

Received Date: October 10, 2023 **Accepted Date:** October 24, 2023 **Published Date:** October 28, 2023

Abstract

We present a 2-year-old boy known case of Spinal muscular atrophy type 2 presented with acute onset quadriparesis following a trivial trauma. On admission child had flaccid quadriparesis without bladder-bowel or respiratory involvement. His blood investigations, MRI Spine and Brain were unremarkable.

On further discussion with family, it was revealed that child was given castor leaf (Ricinus Communis) concoction as a strength booster. Since no antidote is available, child received supportive care and managed conservatively. Weakness improved gradually 24 hours after admission and by 48 hours' child regained his baseline muscle power.

Castor leaves contain a toxin Ricinine. Ricinine is a neurotoxic alkaloid which is known to cause seizures and tremors. Castor leaf poisoning, masquerading as acute flaccid paralysis has never been reported before.

Keywords: Acute Flaccid Paralysis; Ricinine, Ricin; Ricinus Communis; Castor Leaf Toxicity

Case Report

A 5-year-old boy with pre-existing motor delay, diagnosed as SMA Type 2 with osteogenesis imperfecta (OI) presented with complaints of acute onset quadriparesis following trivial trauma. There was no history of fever, recent infection, vaccination, rash, or diarrhoea. No history of altered sensorium, seizures, bladder-bowel involvement, or similar episodes in the past.

On examination the child was hemodynamically stable, afebrile, irritable but consolable. He had blue sclera, no obvious long bone fractures, or external injuries. Nervous system examination revealed age-appropriate higher mental functions, no encephalopathy, no cranial nerve palsy, tongue fasciculations were present with generalised hypotonia, power was 0/5 in all four limbs with areflexia and bilateral ankle contractures. Sensory examination did not reveal sensory loss. No signs of meningeal irritation and examination of spine was unremarkable. Chest was hyperinflated with abdominothoracic pattern of respiration, rest of the systemic examinations were within normal limits.

Initial possibilities of post traumatic spinal cord injury, Landry Guillian Barre Syndrome, Spinal Epidural hemorrhage and Hypokalemic paralysis were considered. In view of history of Osteogenesis Imperfecta with history of trauma and acute onset quadriparesis, his cervical spine was stabilized and an urgent MRI spine and brain was performed to rule out spinal cord injury, epidural hemorrhage or compression, neuroimaging of brain and spine were unremarkable [Figure 1 &2]. Blood investigations revealed normal pH, and anion gap, Serum electrolytes, liver and renal function test were within normal limits.

On repeated enquiry and analysis of recent events, parents revealed that child was administered castor leaf (Ricinus Communis) concoction by grandmother as herbal tonic with a belief that it would improve his muscle strength and cure Spinal Muscular Atrophy

Since no antidote is available for Ricinus Communis, gastric lavage was performed. Electrocardiogram was done to look for conduction abnormalities, he was monitored for hypoglycemia, hemolysis , cardiovascular collapse, hepatic and renal derangements. Child was managed conservatively with close monitoring in Pediatric Intensive Care Unit. Weakness improved gradually after 24 hours of admission and by 48 hours child regained his baseline muscle power.

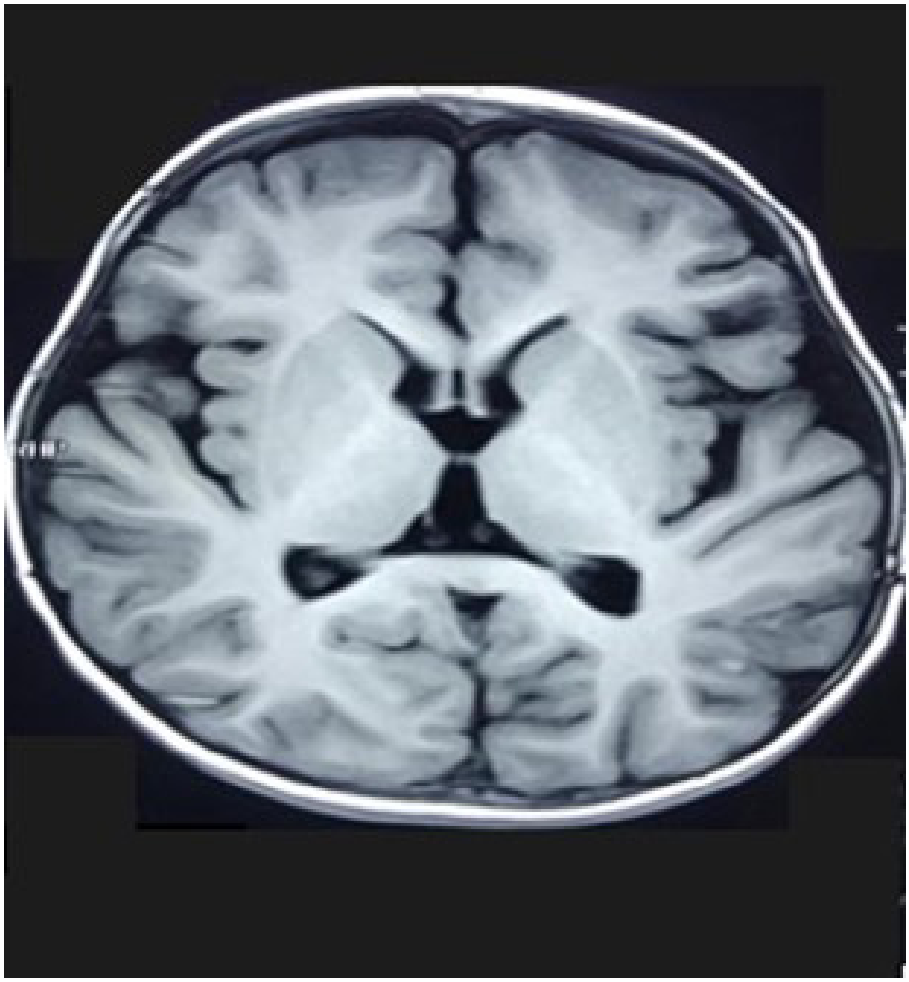

Figure 1: MRI Brain T1 Weighted Axial View

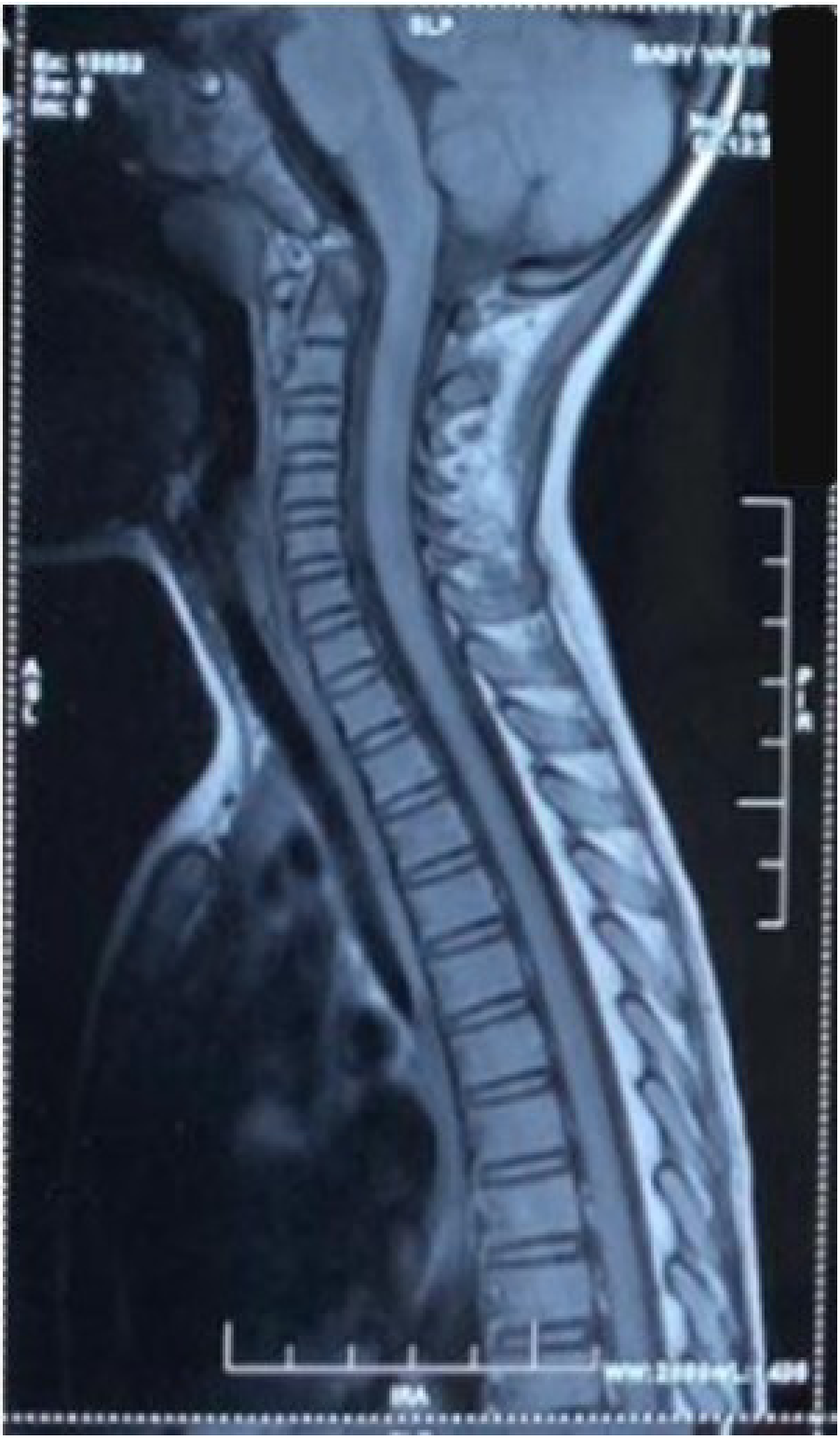

Figure 2: MRI Spine Sagittal View

Discussion

The castor plant (Ricinus Communis L.) has been used for centuries in traditional medicine in Mediterranean and middle eastern countries [1]. Ricinus communis is classified as the most poisonous plant on earth for humans. Castor seeds contain three toxic constituents, namely ricin (glycoprotein), ricinine (alkaloid), and allergen (protein–carbohydrate complex). The toxicity of raw cas-

tor beans is due to the presence of ricin.[2] The seeds of castor bean plant (Ricinus co-munis, L.) contain the largest amount of ricin, but all parts of the plant are toxic.

Castor leaves contain a toxin Ricinine (3-cyano-4-methoxy-N-methy l-2-pyridone), which is a less toxic alkaloid, it is heat stable and found in all parts of the castor plant. Ricinine is absorbed from intestinal tract, toxicity results from profound inhibition of protein synthesis, but other mechanisms such as apoptosis pathways, direct cell membrane damage, alteration of membrane structure and function, and release of cytokine inflammatory mediators have been noted [3,4]. Ricinine stimulates the central nervous system, neurological side effects of Ricinine have been well described in animal studies and it has been used as chemical model for convulsive seizures [5]

Symptoms after ingestion, usually begin 3-20 hours after ingestion, clinical features are nonspecific and may include nausea, vomiting, diarrhea with or without blood, dehydration, muscular pain, abdominal pain and may progress to hypotension, liver failure, renal dysfunction, and death due to multiorgan failure or cardiovascular collapse. [6]

Ricinine is neurotoxic, hepatotoxic and renotoxic. Biochemical derangements include increase in blood urea nitrogen (BUN), aspartate aminotransferase (AST) and alanine aminotransferase (ALT), indicating dysfunction of liver and kidneys. Cardiac complications with Ricine toxicity include include QT interval prolongation, repolarization changes, and intraventricular conduction abnormalities and cardiovascular collapse [7,8].

The number of seeds ingested causing mild to severe symptoms, including a fatal outcome, range from uptake of only single seed to up to 30 seeds [3]. Ricin is so toxic that the amount contained in a single bean may kill a human in just a few minutes [9]. The mechanism of death is peripheral vascular collapse and progressing multiple organ failure, usually within 10 to 72 hours after intoxication [10]. Autopsy in fatal cases have revealed hemorrhagic necrosis in intestines ,heart , pericardial effusion, congestion and petechie in brain and meninges [11].

Currently no specific approved therapy or antidote for Ricinine poisoning is available. Prompt treatment with supportive care is necessary to limit morbidity and mortality. To prevent further absorption of the toxin, treatment with activated charcoal or gastric lavage have been used depending on the time of admission after oral ingestion. High doses of vitamin C has been reported to be beneficial.

Castor bean poisoning has been widely reported in children and adults, majority of cases present with gastrointestinal symptoms, dehydration and shock [12]. This is the first case report of castor leaf poisoning presenting as Acute Flaccid Paralysis Index child did not have other systemic manifestation of ricinine toxicity.

Alternative medicinal practices are rampant in many countries, there is abundant use of herbal medications in Asian countries. Hence it is important to consider Ricinine as one of the rare toxins which may present as Acute Flaccid Paralysis.

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