

IN THE NAME OF GOD

ROLE OF PLASMAPHERESIS IN POISONING  
TREATMENT

*JOURNAL CLUB*

*PRESENTER : DR. MOKHTAR*

## Plasmapheresis

- a medical procedure where a device separates whole blood into the cellular components and plasma
- The plasma is then discarded and is replaced with fresh frozen plasma, a blood product or a plasma substitute
- A procedure in which toxins or auto antibodies can be removed

## Plasmapheresis

- a procedure used to remove large molecular weight , protein-bound molecules from a patient's blood, has been shown to be useful in some cases of drug overdose

# 1. Plasmapheresis in the treatment of multi-drug intoxication involving levothyroxine sodium and calcium channel blockers: a case report

Ran Li<sup>1</sup> ^, Yong-Wei Xu<sup>2</sup> ^, Ying Xue<sup>1</sup> , Xian-Zheng Wu<sup>2</sup> <sup>1</sup>

Shanghai, China; <sup>2</sup> Department of Emergency Medicine( 2022 )

- case reports about the extremely large dose of 15,000 µg of thyroxine intoxication are extremely rare

-A 40-year-old woman

1- unconsciousness

2 sustained hypotension

3 high levels of thyroid hormones (THs)

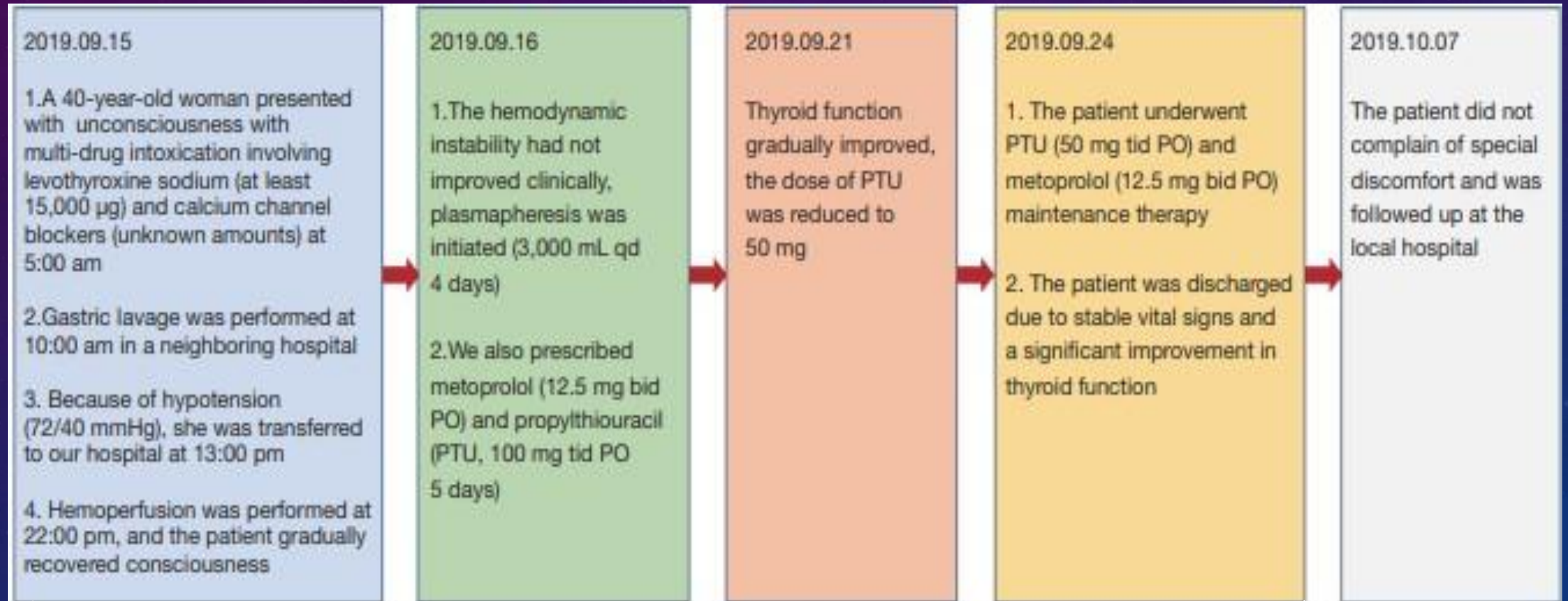
# Plasmapheresis in the treatment of multi-drug intoxication involving levothyroxine sodium and calcium channel blockers: a case report

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- 15,000 µg of levothyroxine sodium
- unknown amounts of diltiazem and amlodipine
- Plasmapheresis
  - 1 the levels of TH declined dramatically after each of the 4 sessions
  - 2 hemodynamics gradually stabilizing and mental state improving

## THE SUMMARY OF THE PATIENT'S THE WHOLE PROCESS OF TREATMENT



Role of Plasmapheresis in Poisoning Treatment

57 / 103

**Figure 2** The summary of the patient's the whole process of treatment.

## plasmapheresis

- improve the clinical status and laboratory examination index by rapid elimination of serum TH and CCB drugs
- Doctors should consider the early use of therapeutic plasmapheresis after administering large amounts of high protein-binding drugs to lower the mortality rate
- gastric lavage

## 2. Severe colchicine poisoning treated successfully with kidney replacement therapy and plasmapheresis: a case report

D. H. Schaffer, D. L. Overbeek, T. B. Erickson, E. W. Boyer, C. Goldfine, S. A. Muhsin & P. R. Chai  
(2022)

- Colchicine is commonly prescribed for treatment of inflammatory conditions
- narrow therapeutic window and dangerous toxicity profile
- A 37year old male
- nausea, vomiting, and diarrhea
- unintentionally ingesting 36 mg of colchicine 17 h prior to arrival



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- initial colchicine concentration resulted at 5.1ng/mL (30h post-ingestion) and peaked at 12ng/mL (40h post-ingestion)
- continuous kidney replacement therapy (CKRT) beginning on his first day
- plasmapheresis on hospital days two through four

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-was complicated by multiorgan failure including coagulopathy, respiratory failure, neuropathy, renal failure, pancytopenia, and heart failure

- discharged ---day 24

-On clinical follow up four months after discharge have no significant persistent morbidity related to colchicine overdose

**Colchicine overdose** represents an uncommon but life-threatening syndrome  
progressive multi-organ dysfunction

- 1- bone marrow aplasia
- 2- cardiac toxicity
- 3 rhabdomyolysis
- 4 sepsis
- 5 ARDS

Aggressive supportive care including early initiation of **continuous kidney replacement therapy** and **plasmapheresis** may be necessary to manage the expected course of toxicity due to colchicine poisoning

### 3. Plasmapheresis in Organophosphorus Poisoning – Intensive Management and its Successful Use : Case Report

Clinic Toxicol 2011 - Journal of Clinical Toxicology- India

-A 12 year old boy

-outpatient clinic

-history of six episodes of non bilious vomiting and four episodes of loose stools in one hour

- no history of fever

- He had taken a cool drink an hour prior to the onset of symptoms

# Plasmapheresis in Organophosphorus Poisoning – Intensive Management and its Successful Use : Case Report

Clinic Toxicol 2011 - Journal of Clinical Toxicology- India

- Anxious
- general and systemic examinations were normal
- Within thirty minutes, his mentation altered
- Parents vehemently denied any possibility of poisoning

# PLASMAPHERESIS IN ORGANOPHOSPHORUS POISONING – INTENSIVE MANAGEMENT AND ITS SUCCESSFUL USE : CASE REPORT

CLINIC TOXICOL 2011 - JOURNAL OF CLINICAL TOXICOLOGY- INDIA

- his clinical condition deteriorated
- papillary constriction amounting to pinpoint nature
- generalized tonic-clonic seizures
- brainstem type of breathing
- cardiorespiratory arrest
- resuscitated and ventilated

# Plasmapheresis in Organophosphorus Poisoning – Intensive Management and its Successful Use : Case Report

Clinic Toxicol 2011 - Journal of Clinical Toxicology- India

- copious secretions from endotracheal tube
- empirical treatment with atropine
- Midazolam

# Plasmapheresis in Organophosphorus Poisoning – Intensive Management and its Successful Use : Case Report

Clinic Toxicol 2011 - Journal of Clinical Toxicology- India

-CT scan---NL

- serum cholinesterase was done by Butyrylthiocholine iodide hydrolysis /colorimetric method
- 177.9 U/L (Normal range: 2180 – 9180 U/L)
- Pralidoxime
- toxicology report --- negative for all opiates



# Plasmapheresis in Organophosphorus Poisoning – Intensive Management and its Successful Use : Case Report

Clinic Toxicol 2011 - Journal of Clinical Toxicology- India

- With treatment, the general condition initially improved
- second day after
  - there was acute clinical deterioration with development of desaturation, with associated mediastinal shift
  - Needle aspiration
  - chest x-ray showed a collapse of the right lung
  - fiberoptic bronchoscopy
  - weaned from the ventilator and connected to non invasive ventilation

# Plasmapheresis in Organophosphorus Poisoning – Intensive Management and its Successful Use

## -90 HOURS AFTER ADMISSION

- unresponsive
- mild constriction of pupils
- respiratory arrest fairly soon after the clinical deterioration from which he was revived and ventilated again
- A repeat CT brain and chest xray were normal
- serum cholinesterase showed a value of 1896.5U/L
- A diagnosis of intermediate syndrome

## PLASMAPHERESIS IN ORGANOPHOSPHORUS POISONING – INTENSIVE MANAGEMENT AND ITS SUCCESSFUL USE

- sodium --181mmol/L
- atropinisation
- plasmapheresis was performed via a double-lumen subclavian catheter and one sitting involving 20 ml/Kg of plasma volume exchange (involving fresh frozen plasma) was performed
- The cholinesterase increased from 1896.5 to 2437.5 U/L after this and the serum sodium became 177mmol/L
- Haemodialysis
- The child improved gradually over the next few days
- weaned off the ventilator
- Psychiatric counselling
- discharged home in a stable condition after a period of two weeks from the time of admission

- **Plasmapheresis** can be an effective alternative by increasing cholinesterase
- Plasma can be an effective source of cholinesterase

## 5.The effect of plasmapheresis on plasma cholinesterase levels in a patient with organophosphate poisoning

Muhammet Guven\*, Murat Sungur and Builent Eser

Department of Intensive Care, Turkey Human & Experimental Toxicology (2004)

- 62-year-old man was admitted to the intensive care unit 4 hours after accidental exposure to fenitrothion (a moderately hazardous organophosphate compound) by dermal route
- nausea and vomiting
- B/P= 100/70 mmHg
- HR= 60 beats/min
- miosis, excess salivation, fasciculation and respiratory distress
- (ChE) level was 4001 IU/L (normal values: 4000- 10 000 IU/L)

- Initial treatment included **atropine** (3 mg/hour, totally 230 mg)
- **pralidoxime** (3 g/day)
- cleansing the skin with soap and water
- endotracheal intubation and mechanical ventilation

## 5.The effect of plasmapheresis on plasma cholinesterase levels in a patient with organophosphate poisoning

- Aspiration pneumonia was developed on day 3
- sepsis occurred on day 5
- ChE levels decreased gradually
- On day 5, plasmapheresis was performed for sepsis
- AChE levels increased from 2101 IU/L to 6144 IU/L after
- Atropine and pralidoxime were stopped
- weaned from mechanical ventilation 3 days after plasmapheresis  
Imipenem and amikacin were given for *Pseudomonas aeruginosa*
- He was discharged from the ICU on the 16th day

- plasma exchange therapy may increase plasma cholinesterase levels
- provide extra time for elimination of organophosphate compounds from the human body
- reactivation of AChE by oximes and restoration of decreased plasma cholinesterase levels by liver
- effects of plasma cholinesterase on neuromuscular system and central nervous system needs to be studied further and thus, clinical studies must be organized



## 6. Current applications of plasmapheresis in clinical toxicology

Nephrol Dial Transplant (2003)

Vesselin D. Nenov<sup>1</sup>, Petko Marinov<sup>2</sup>, Julia Sabeva<sup>2</sup> and Dimitar S. Nenov<sup>1</sup> Military Hospital of Varna, Bulgaria

- plasmapheresis is used successfully in the treatment of :

1 phalloid mushroom intoxications

2 some drug intoxications (tricyclic and 4-cyclic antidepressants, L-thyroxine, verapamil, diltiazem, carbamazepine)

3 some heavy metal intoxications (mercury, vanadate)

THE END