Ratting Out the Answer: Post-Acute Patient Safety in Rodenticide Overdose

Ariana McCauley (Resident Pharmacist)– Pharmacy Department, Royal North Shore Hospital, Northern Sydney Local Health District, NSW

Objective

To demonstrate the complexity of managing suicidal patients with intentional rodenticide overdose in the post-acute setting, as well as understanding the importance of toxicology in the management of overdose.

Case Study

Clinical Features

A 45-year old Caucasian female presented to the Emergency Department with a 5-day history of epistaxis, rectal and vaginal bleeding.

Nasal cauterisation was conducted upon admission, however symptoms still persisted.

Initial pathology results showed an elevated INR beyond upper limits.

- **INR >10**
- **APTT 78 sec**
- Hb 80 g/L
- Cr 84 umol/L
- LFTs normal

Past Medical History

- Major depressive disorder
- Previous self harm resulting in anaemia
- Suicidal ideation

Current Medications

- Venlafaxine MR 150mg nocte
- Quetiapine 100mg nocte
- Lithium SR 450mg daily

Despite initial withholding of information from the patient, further investigation revealed repeated, intentional ingestion of rodenticide, difenacoum (super-anticoagulant) over the course of 3 weeks. The exact ingested dose was unknown.

Medical Management

Initial management included:

- Prothrombinex 50U/kg
- Phytomenadione (Vitamin K) 10mg

She was considered high risk of a major bleed and subsequently commenced on long-term (minimum 3 months) phytomenadione with a weaning plan after liaison with pharmacy, haematology and poisons.

Phytomenadione Dose	Duration
50mg BD	2 months
40mg BD	2 weeks
30mg BD	2 weeks
20mg BD	2 weeks
10mg BD	2 weeks, then cease if appropriate

Table 1: Dose reduction plan for phytomenadione

Toxicology

Difenacoum is a second generation super-anticoagulant rodenticide. Pharmacologically, it is a vitamin-K antagonist structurally related to warfarin.

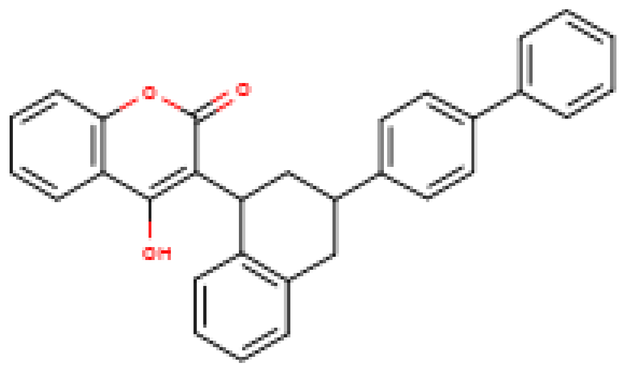

Figure 1: Chemical Structure of Difenacoum

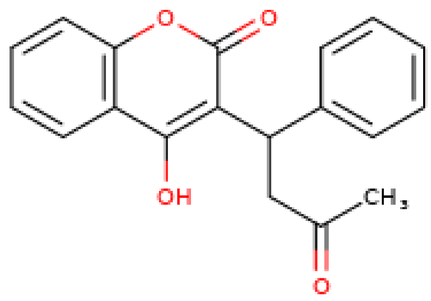

Figure 2: Chemical Structure of Warfarin

Difenacoum	Warfarin
118 days	7 days

Table 2: Comparison of half-life

Pharmacokinetics

Difenacoum undergoes biphasic elimination, with a rapid phase half-life of 3 days and a slow phase half-life of 118-120 days.

In comparison to warfarin, which has a terminal half-life of approximately 7 days.

This is the major determinant for the minimum 3 month duration of treatment of oral phytomenadione for this patient.

Pharmacist Intervention

The pharmacist played an important role in the safety and review of the patient in the acute and post-acute setting as highlighted in the interventions below:

Accessibility of Oral Formulation

- A review of current available phytomenadione formulations showed only 10mg injectable glass ampoule formulations available. Oral tablets had been discontinued.
- Arranged access to 10mg oral tablets via Special Access Scheme (SAS). However, a delay in access required the patient commence therapy using the glass ampoules, prompting concerns regarding self-harm and compliance.

Palatability

- Taste of liquid in ampoules is unpalatable for the patient.
- Medicines information enquiry conducted about appropriateness of mixing to improve flavour.
- Recommendation to mix contents of ampoule with orange juice or alternative to improve flavour and aid compliance.
- Counselled on appropriate technique to open ampoules and safe disposal.

Staged Supply

- Due to the interim unavailability of oral phytomenadione, a stage supply of glass ampoules was organised due to concerns regarding self harm and compliance due to palatability of liquid from ampoules.
- Supplied quantity of one week at a time through to outpatient pharmacy. The pharmacist was able to assess patient compliance, safety and progress during treatment. If there were any concerns about the patient's wellbeing, this would be communicated to the treating physician.

Conclusion

This case highlights the importance prioritising safety in often complex and high-risk patients with suicidality. The pharmacist is in a unique position to not only provide acute clinical care, but also to ensure that an optimal balance of safety, tolerability and compliance is achieved in extended post-acute pharmacotherapy.

References

- Therapeutic Guidelines, *Toxicology: long-acting anticoagulant rodenticides (superwarfarins),* June 2019
- TOXNET *Difenacoum* [Accessed September 2019]
- TOXNET *Warfarin* [Accessed September 2019]

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