

# Feline Hyperkalemia: Unveiling the Role of Insulin Therapy in Treatment

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**Abstract:** This study presents a case report of a 6 - month - old feral cat with symptoms of weakness, inappetence, and vomiting, diagnosed with acute kidney failure and hyperkalemia. Clinical examination revealed elevated serum levels of creatinine, BUN, and potassium. Treatment involved fluid therapy, antibiotics, antiemetics, and diuretics, alongside insulin and dextrose for hyperkalemia management. Following three days of treatment, significant improvement was observed in biochemical parameters. The discussion explores various treatment options for hyperkalemia, focusing on the mechanism of action of insulin and dextrose in promoting intracellular potassium transport while addressing the risk of hypoglycemia. This case underscores the importance of timely intervention and appropriate management strategies in addressing hyperkalemia in veterinary practice.

**Keyword:** Hyperkalemia, Insulin, Acute Renal Failure.

## 1. Introduction

Potassium serves as the primary ion accountable for maintaining the typical resting cell membrane potential. When hyperkalemia occurs, it leads to membrane depolarization, consequently reducing cell excitability. This impact is particularly prominent in cardiac and skeletal muscle cells [1 - 3]. A retrospective analysis of all - cause dyskalemia conducted in 2019 revealed a significant increase in the risk of death in dogs and cats which were presented with moderate - to - severe hyperkalemia [4].

## 2. Case History and Clinical Observation

A 6 - month - old feral cat came in with a history of weakness, inappetence, and three episodes of vomiting during the course of the night. On clinical examination, the animal had temperature of 100.5°F and pallor of conjunctival and oral mucus membranes. To rule out the Feline parvo - virus infection, FPV snap test is performed that comes negative. Subsequently, blood is drawn into plain vial and EDTA[at]1 mg/ml for hematology and serum biochemistry, respectively. Hematology showed no significant changes, but serum biochemistry showed higher than normal levels of creatinine (10.7 mg/dL; normal range: 0.8 - 2.4 mg/dL), BUN (>130 mg/dL; normal range: 16 - 36 mg/dL), and potassium (8.8 mmol/L; normal range: 3.5 - 5.6 mmol/L). So the presented case was diagnosed as Acute Kidney Failure with hyperkalemia.

## 3. Treatment

The treatment of this cat includes fluid therapy for flushing out the increased serum creatinine, Inj Amox&Clav[at]20mg/kg, Inj Pantoprazol[at]1mg/kg, Inj Ondancetrone[at]0.5mg/kg and Inj Frusemide[at]2mg/kg for 3 days. For the treatment of hyperkalemia, 2 shots of Inj insulin[at]0.5 IU/Kg Q12hr was given along with Dextrose 25%[at]2g/IU to avoid hypoglycemia.

Following three days of treatment, the cat exhibited the greatest improvement, with improvements in the biochemical

profile values of creatinine (1.5 mg/dL; normal range: 0.8 - 2.4 mg/dL), BUN (23 mg/dL; normal range: 16 - 36 mg/dL), and potassium (4.5 mmol/L; normal range: 3.5 - 5.6 mmol/L). After the treatment owners were advised give only renal diet for next 6 months.

## 4. Result and Discussion

Treatment options for hyperkalemia are numerous and include intravenous isotonic crystalloid fluid therapy (IVF), medications (such as insulin with dextrose, sodium bicarbonate, and adrenergic receptor agonists), and, in the event of obstruction, urethral reversal [5, 6].

Insulin stimulates potassium transport via activating the Na<sup>+</sup>/K<sup>+</sup> - ATPase membrane pumps, which transfers potassium from the extracellular to the intracellular compartment. Dextrose functions similarly in that it lowers the risk of hypoglycemia and hypoglycemic seizures while also causing the release of insulin [7]. Although a particular dextrose: insulin ratio was not found to be protective against hypoglycemia, there is evidence to suggest that the widely advised dextrose: insulin ratio of 2g/IU may not be sufficient to prevent hypoglycemia in all cats [8].

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