

Refractory Hypoglycemia due to Humulin 70/30 Insulin Overdose: A Case Report

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Abstract

Humulin 70/30 insulin is an intermediate acting medication used for treatment diabetes mellitus. According to systematic review and there have been forty four case reports of overdoses with different types of insulin.

We present a unique case of insulin Humulin 70/30 overdose due to suicidal attempt that presented with persistent hypoglycemia and required prolonged hospital treatment.

A 47 year's old female patient presented to the emergency department due to decreased level of consciousness after self-administration of 2000 international unit Humulin insulin 70/30 suicidal attempt. In the emergency department patient treated with 250 ml D10% then shifted to the medical department. The patient continue treatment with dextrose 10% 200 ml/hour as continuous infusion, unfractionated heparin 7500 international unit/12 hour, hydrocortisone 100mg /6 hours, octreotide 100 microgram /8 and glucagon 1 mg . On the fourth day all medication and D10% stopped and the patient still under observation then discharged on will general condition without hypoglycemia attacks.

A single high overdose of Humulin insulin can present with prolonged persistent hypoglycemia that is refractory to D10% alone. All physicians should know the guidelines to treat severe form of hypoglycemia and when to admit into medical department or intensive care unit with follow up for blood glucose and serum electrolyte monitoring.

Key words: hypoglycemia; diabetes; humulin insulin; dextrose

Introduction:

Humulin insulin 70/30 (insulin isophane human 70 unit/insulin regular human 30 unit)/ml is intermediate acting is used to treat diabetes mellitus. It is the mostly prescribed type of insulin in Gaza Strip. The most important adverse effect of insulin in emergency department is hypoglycemia. Herein, we report a case of Humulin insulin overdose resulting five days (120 h) of hypoglycemia in a diabetic patient after self-administration of 2000 IU Humulin suicidal attempt. For our knowledge, this is the highest reported Humulin insulin dose ever reported and the first time ever faced in Gaza Strip hospitals.

Case presentation:

A 47 years old female patient presented to the emergency department due to decreased level of consciousness after self-administration of 2000 international unit of Humulin insulin (70/30) unit/ml suicidal attempt. Assessment in the emergency department reveal random blood glucose level 20 mg/dl, temperature 36, oxygen saturation 98%, blood pressure

167/74 mmHg, heart rate 107 beat per minute. Patient laboratory data on admission were as follow: AST 52 IU, Na 142 mmole, K3.5mmole, Ca ionized 1.1 mmole, creatinine 0.8, complete blood count reveal WBC 18.1, HGB 12.1 g/dl, PLT 228. The patient received 250 ml Dextrose 10% as emergency treatment for sever hypoglycemia, then admitted to the medical department. Patient medical history consisted of insulin-dependent diabetes mellitus since 20 years treated with NPH (40 unit Am, 40 unit mid-day and 40 unit afternoon) and hypertension since 20 years on Enalapril 10 mg per day. In the medical department patient treated with dextrose 10% 100 ml/hour as continuous infusion due to none availability of D50% or D20% with regular blood glucose level measurement every two hours. On the second day patient blood sugar level still fluctuated around 60 mg/dl (see fig 1 below), so the rate of D10% increased to 200 ml/hour, unfractionated heparin 7500 international unit/12 hour was added. On the third day hydrocortisone 100 mg/6 hours, octreotide 100 microgram /8 hours added to counter the release of endogenous insulin due to dextrose administration and glucagon 1 mg also added to over persistent hypoglycemia.

On the fourth day patient improved dramatically clinically and her blood glucose level stabilized above 110 mg /dl, so octreotide withdrawn, hydrocortisone dose decreased to 100 mg /8 hours, D10% decreased to 100 ml/hour. On the fifth day all medication and D10% stopped and the patient still under observation then discharged on will general condition

without hypoglycemia attacks. On discharge RBG 210 mg/dl, Cr 0.6 mg/dl, Na 139 mole, K3.8 mmole, Ca ionized 1.2 mmole. BP 120/70 mmHg, temp 37, respiratory rate 17/ minute, heart rate 80 beat/minute, repeated CBC was normal.

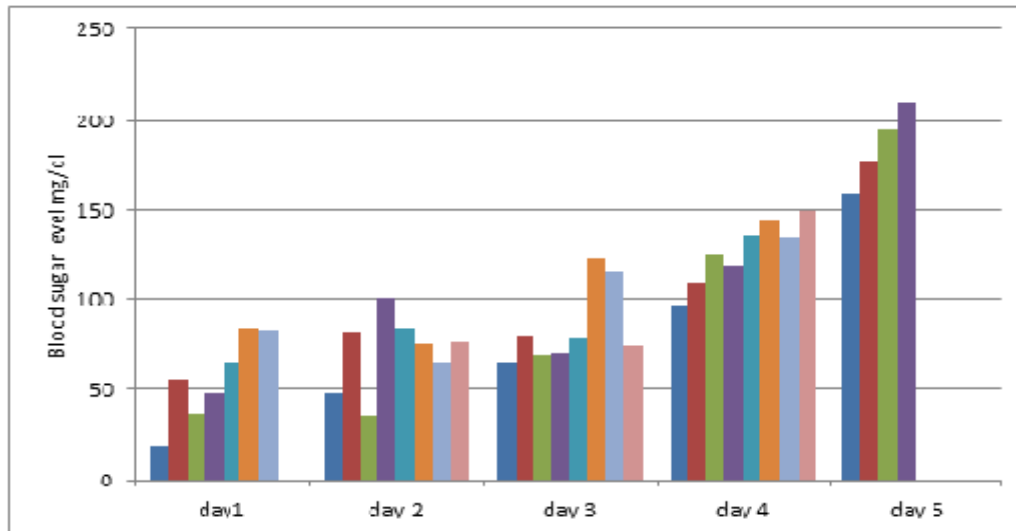


Figure 1: blood glucose level for the patient during hospital stay.

Discussion

Insulin overdose is a challenging clinical problem in the emergency department [1]. There are lot of cases reported hypoglycemia due to insulin but reports of massive overdoses in the literature remain rare. During our search we found a number of case reports of large insulin overdoses the largest of which was 10,000 units of Humulin R. Other overdoses were 800 units of lispro, 3,800 units of glargine, 2,500 units of NPH insulin, 750 units regular insulin and 750 units NPH insulin and 1,500 units of overdose of insulin glargine was also reported. [2-8]. Of 1,523 published articles, 45 cases of insulin overdoses were included with a total median insulin dose of 900 international units (IU) (range 2,600-, 800 IU).

Hospitalization occurred in 44 cases with a median hospitalization duration of 94 hour (range 12-72 hour), and one-third (n = 15) admitted to the intensive care unit [9]. Some of the cases of insulin induced hypoglycemia become refractory to treatment which become clinical challenge and needs administration of octreotide and longer period of treatment [10, 11]. A number of factors affect the duration of hypoglycemia, including the route and site of administration, injection volume and concentration and local blood supply. Injections of larger volumes of insulin are more slowly absorbed from the subcutaneous tissue which may result in delayed and prolonged hypoglycemia following the injection [12]. Other factors, such as the presence renal dysfunction, can prolong the duration of hypoglycemia as well. Therefore, it may be difficult to predict the duration of hypoglycemia in cases of insulin overdose. Based on case reports involving insulin overdose, hypoglycemia has been reported up to several days after injection [13, 14].

The initial management for hypoglycemia should primarily involve oral carbohydrate ingestion [15]. However, if the patient have sever hypoglycemia with decreased level of consciousness or coma. Parenteral dextrose and/or glucagon should be administered [15, 16]. This should be accompanied by frequent monitoring of serum glucose levels and electrolytes, especially serum potassium. Continuous infusions of dextrose depends on the patient's response to initial therapy and the

ability to eat food [16]. If hypoglycemia persists more than three days after D% administration, other treatment options were considered such as octreotide and glucocorticoids [9, 17, 18]. Hydrocortisone was chosen due to its shorter duration of action, thereby reducing the risk of subsequent hyperglycemia and octreotide administered to counter the effect the release of endogenous insulin due to infusion of D%. Following the administration of two days (six dose) of hydrocortisone and six doses of octreotide our patient weaned off both the D10 and glucagon and was able to maintain euglycemia.

Based on prior cases involving the use of glucocorticoids for insulin-induced hypoglycemia, and based on our case we feel that the administration of hydrocortisone enhance resolution of hypoglycemia and reduced the continued need for parenteral dextrose and glucagon in the present case so we prefer early administration of hydrocortisone [18]. Also we believe that early administration of octreotide in patients with hypoglycemia due to insulin overdose may be associated with early recovery from hypoglycemia in addition to glucagon [17, 19]. Glucagon acts by promoting glycogenolysis and gluconeogenesis and thus has limited use once glycogen stores have been depleted [19].

Conclusion

Insulin overdose is a medical emergency, most cases can be treated in the medical ward but some cases requires intensive care admission and frequent monitoring of blood glucose and electrolytes. Treatment mainly continuous dextrose infusion (D10% or 25% or 50%). Intravenous infusion of D10% can lead to volume overload. Our case adds to the literature supporting the use of glucocorticoids and octreotide in the management of hypoglycemia due to Humuli insulin overdoses. Early administration of glucocorticoids and octreotide should be considered in cases of refractory hypoglycemia due to overdose of intermediate insulin to reduce IV fluid requirements, and decrease the risks associated with prolonged hypoglycemia.

Conflicts of Interest

The authors declare that they have no conflicts of interest.

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