Hyperkalemic paralysis: Etiology

Hyperkalemic periodic paralysis is an autosomal dominant disease characterized by paralysis precipitated by events causing hyperkalemia. Patients can have mild myotonia (noted on EMG) between paralytic episodes. The disease stems from a mutation in a voltage gated sodium channel ($Na_V1.4$). Perioperative management of these patients requires special attention be paid to preventing and avoiding the myotonic and paralytic episodes precipitated by an increase in potassium.

There are several noted precipitants to myotonic or paralytic episodes and unfortunately I am unable to explain a physiologic basis for them all, so some memorizing is necessary (unless someone knows of a good way to explain them):

-Eating potassium rich foods.
-Rest following exercise.
-Cold exposure.
-Pregnancy.
-Emotional stress.
-Fasting.
-Glucocorticoid use.

To avoid an inappropriate fasted state (with resulting fall in insulin, rise in glucagon, and rise in potassium), consideration should be given to admitting these patients preoperatively so that they can receive a dextrose-containing maintenance fluid while NPO. During the anesthetic, depolarizing muscle relaxants, neostigmine, increases in potassium, hypoglycemia, and hypothermia should be avoided. Medications typically used to treat hyperkalemia should be readily available if needed: calcium, glucose, insuline, beta agonists, diuretics.

Further Reading: Zhou J, Bateman B, Allen PD, Pessah IN. Miller's Anesthesia. 9th ed. Pp 1139-40. Elsevier, 2020.