Case Reports

Calcium Gluconate —Its Unusual Complication

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Children receiving intravenous (IV) fluids, electrolytes and antibiotics are particularly prone to fluid escape (extravasation). Extravasation of chemotherapeutic agents, hypertonic fluids, sodium bicarbonate and calcium salts cause skin ulceration and necrosis(l). Children who are irritable or getting repeated seizures are more prone to IV bulge and fluid escape at the site, because of their thin fragile veins(l). IV calcium gluconate is a frequently used electrolyte in pediatric practice. Although other complications of calcium gluconate extravasation are well known, soft tissue calcification is rare. This case report describes one such case.

Case Report

A four-month-old female child weighing 4 kg presented with history of swelling over the dorsum of right foot and leg of one and half months duration. Swelling was extending from base of toes on lateral side upto ankle joint. It was hard to feel and brownish in color. The child's right leg was swollen. There was brownish hard swelling over the dorsum of right tibia extending from ankle joint upto tibial tuberosity.

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This child was treated at the age of two months for generalized convulsions due to hypocalcemic tetany with anticonvulsants, IV fluids and IV calcium gluconate. Skiagram of right leg showed soft tissue calcification over the dorsum of right foot and the ankle joint. There was also extensive calcification over the entire length of the tibia *(Fig. 1).* No specific treatment was given. Follow up radiograph taken at the end of two month showed almost complete resorption of calcification *(Fig. 2).*

Fig. 1. X-ray of right lower limb showing soft tissue calcification over the dorsum of foot and tibia (arrows).

Discussion

Hypocalcemia is the commonest electrolyte abnormality which is responsible for neonatal and early infancy seizures. In acute hypocalcemia, calcium gluconate has generally been the drug of choice for IV use. This should not he undertaken lightly as rapid injection can cause extravasation leading to marked swelling, erythema and soft tissue necrosis. Soft tissue calcification after extravasation of calcium gluconate is unusual as reported in our case.

It is postulated that the subcutaneous nodules due to extravasation are caused by deposition of calcium phosphate(2).

Fig. 2. X-ray taken after two months period shows almost complete disappearance of calcification.

The soluble calcium gluconate may cause coagulation necrosis of tissues and clotting within local blood vessels thus accounting for necrosis. The phosphate from surrounding damaged vessels probably precipitates with the calcium that has now diffused into tissue forming calcium phosphate which is radio-opaque. Murthy *et al*.(3) described nine neonates where the IV Calcium gluconate had extravasated and 3 to 20 days later, five developed subcutaneous nodules and four had abscess like lesions. All had X-ray evidence of calcification. In our case, 15 days after IV calcium gluconate therapy, the child developed subcutaneous nodules. Berger *et* al. (4) reported three cases of soft tissue calcification secondary to IV calcium gluconate extravasation. In their experimental study, they have demonstrated that the associated erythema and size of mass appear to be dose related. The maximum histologic and roentgenographic changes occur at two weeks. By six weeks, only minimum changes persist histologically and roentgenographic calcification is no longer evident. Almost complete resorption of subcutaneous calcification was noted in the present case after two months period.

Lee *et al*.(5) demonstrated various roentgen patterns of extravasation of calcium gluconate in the tissues of the neonate. Roentgenograms show three distinct patterns of soft tissue calcification or combination of these patterns. Calcification may be localized near the site of injection as an amorphous mass and may mimic myositis ossificans. Calcification may be quite diffuse and present as subcutaneous plaques and may simulate neonatal sub-cutaneous fat necrosis and in older children, dermatomyositis. The third pattern is that of vascular or perivascular calcification. The vascular pattern may be confused with rare cases of neonatal arteriosclerosis.

These radiograph findings in the absence of clinical history of IV calcium gluconate infusion may puzzle the radiologist and the clinician.

Extravasation of IV calcium gluconate and its further complications can be prevented by using proper IV site and use of flexible catheter rather than metal needle. The usual dose of 10% calcium gluconate is 1-2 ml per kg injected IV slowly over a period of five to ten minutes after dilution with dextrose or distilled water. Calcium-gluconate has been shown to be incompatible and forms precipitate when mixed with sodium bicarbonate, prochlorperazine maleate, streptomycin and amphotericin. If extravasation occurs, it is recommended that the extremity be elevated for 48 hours and cold pack be applied for fifteen minutes, three to four times a day. No active surgical intervention is required since the lesions resolve without any specific therapy.

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