Use of liposuction and saline washout for the treatment of extensive subcutaneous extravasation of corrosive drugs

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SUMMARY

We report a case of extensive subcutaneous extravasation of corrosive drugs used during cardiac resuscitation, in a neonate undergoing cardiac catheterization. Early management with hyaluronic acid, liposuction and saline washout of the extravasated fluid prevented development of any tissue damage. This simple technique was easy to use and extremely effective. (Br. J. Anaesth. 1994; 72: 702-704)

KEY WORDS


A recognized complication of i.v. infusion is extravasation of infusate into subcutaneous tissues [1, 2]. Leakage of hypertonic acidic solutions (parenteral nutrition, 10% glucose, calcium, potassium), hypertonic alkaline solutions (4.2% and 8.4% bicarbonate), vasoactive drugs (noradrenaline, adrenaline, dopamine, dobutamine) and cytotoxic drugs is known to cause full thickness skin necrosis and precipitate significant scarring around nerves, tendons and joints [3]. We describe how liposuction and saline washout prevented certain tissue necrosis in a haemodynamically unstable patient requiring cardiopulmonary support.

CASE REPORT

A 4-month-old girl, weighing 5 kg, with tetralogy of Fallot and severe infundibular stenosis, underwent surgery for a modified Blalock-Taussig (BT) shunt. A 20-gauge (32-mm) Abbocath-T cannula was inserted into the left internal jugular vein. The position of the cannula was confirmed by measuring intravascular pressure and noting the waveform. The cannula was fixed to the skin with adhesive tape and covered with a transparent adhesive film. After operation, despite a patent BT shunt, arterial oxygen saturation was inadequate and had to be maintained with an infusion of dobutamine. Six hours after surgery, cardiac catheterization revealed left pulmonary artery stenosis which was dilated with a balloon. During catheterization, the patient became profoundly hypotensive, acidotic and hypoglycaemic on two occasions. The first time she responded to resuscitation with adrenaline, bicarbonate, calcium and glucose, and arterial blood-gas measurements confirmed an increase in pH and blood concentration of glucose. On the second occasion, she failed to respond to 8.4% bicarbonate 20 ml, 10% calcium gluconate 10 ml, 50% glucose 5 ml, 1:1000 adrenaline 3 ml and 4.5% human albumin solution 50 ml, which had been effective when given earlier. No resistance to injection was noted. Additional resuscitative drugs were given via a cardiac catheter in the femoral vein resulting in immediate improvement in the patient's condition. The patient's head and neck, which had been covered by sterile drapes and rendered inaccessible by the x-ray imager, were uncovered immediately. A large subcutaneous extravasation (fig. 1) was apparent, extending from the mastoid process downward over the left side of the neck and supraclavicular region to the nipple. The skin was white and cold with no capillary filling. The cannula was aspirated and removed without bleeding. Fluid was expressed from the site and collected for biochemical analysis (osmolality 777 mosmol litre⁻¹, calcium 3.9 mmol litre⁻¹, pH 7.12).

The area of extravasation was infiltrated with hyaluronidase 1500 u. to increase the permeability of subcutaneous tissues. A second small stab incision was made in the supraclavicular region and a 4-mm Majou SL980 liposuction catheter was inserted and manipulated vigorously to further increase the permeability of the subcutaneous tissues. Low-grade suction (200 mm Hg) was used to aspirate the extravasated fluid, but without aspirating subcutaneous fat. A Pendlebury 5-cm neonatal peritoneal dialysis cannula was inserted and normal saline 200 ml was flushed through the subcutaneous tissue. The wounds were dressed with dry gauze. The patient recovered and showed no signs of soft tissue damage on discharge 2 weeks later.

DISCUSSION

Extravasation of many drugs and infusions is known to cause tissue necrosis. Extravasation is caused usually by leakage around the original
LIPOSUCTION TO TREAT SUBCUTANEOUS EXTRAVASATION

Fig. 1. Extensive extravasation extending from the left ear to the left nipple. The skin was white and cold with no capillary filling.

puncture site at the point at which the cannula enters the vessel [4]. Continued leakage of fluid and local swelling may cause displacement of the cannula from the vessel, further exacerbating the situation. Cellular damage may be caused by adverse changes in the osmotic equilibrium between intracellular and extracellular fluids, changes in pH leading to precipitation of cellular proteins, induced vasospasm, direct toxic effects or simply an increase in local tissue pressure causing occlusion of small vessels. When extravasation occurs, there is no recognized algorithm for predicting which cases may progress to develop significant tissue necrosis. Early signs of extravasation may appear innocuous and underestimate the extent of injury. Even when the overlying skin appears intact, scarring around nerves, tendons and joints may occur.

There is a diversity of opinion on the management of extravasation injuries. Irrigation by injection of saline to dilute and flush a localized area has been proposed [5]. Hyaluronidase has been used alone [6] to facilitate absorption and spread of the infusate. Ice or steroid cream [7] has also been used to minimize the inflammatory reaction caused by extravasated fluids. There are no large-scale controlled studies of the management of extravasation injury. Moreover, the wide range of sites of injury, coupled with imprecise knowledge of the amounts of drug involved, make comparison of treatments between reports impossible. However, a recent review by Gault emphasized that early aggressive treatment of extravasation injuries was associated with a significantly better outcome; 89% had no signs of soft tissue damage and 11% had minor skin blistering and delayed healing, compared with similar injuries that were untreated initially and 50% required skin grafting, flap repairs or amputation [8]. These results were based on a policy of removing as much extravasated material as possible within the first 24 h using liposuction or saline washout.

Saline washout requires a sterile technique. Hyaluronic acid is first infiltrated into the affected subcutaneous tissue to improve access to the tissue planes. Several small exit stab incisions are made over the affected area. A blunt cannula is inserted into the subcutaneous space and the area flushed with a suitably large volume of normal saline. Excess fluid is expressed from the wound. This technique may be used alone, or, in this case, preceded by liposuction to further define soft tissue planes for saline washout. Liposuction is performed by inserting a blind-ended liposuction cannula through a stab incision into the subcutaneous tissue. Extravasated fluid is aspirated by means of low-grade suction. High suction pressure will remove subcutaneous fat and perhaps exacerbate tissue damage. This morbidity occurred under the classic conditions of an unconscious patient, covered by sterile drapes, undergoing an emergency procedure late at night in a darkened room. When extravasation of corrosive agents occurs, any tendency to wait and observe must be avoided, as the extent of subsequent soft tissue injury is invariably worse than predicted on initial examination. The eventual scarring may prove to be more debilitating than the primary disease. We would therefore recommend early detection of extravasation through vigilance and prompt treatment with liposuction and saline washout.

REFERENCES

