CASE REPORT

Inadvertent Intraarterial Injection Leading to Gangrene: A Rare but Devastating Postoperative Complication

Dasgupta Mandira · Adhikari Sudhir ·
Datta Mallika

Received: 28 July 2009 / Accepted: 12 June 2012 / Published online: 12 March 2013
© Federation of Obstetric & Gynecological Societies of India 2013

Introduction

There are many anesthetic hazards of major operations, some of which may be fatal and others may leave the patient with terminal disability. Unintentional intra-arterial (IA) injection of medications can lead to clinically important sequelae, including paresthesias, severe pain, motor dysfunction, compartment syndrome, gangrene, and limb loss. Incidences of these complications have been reported to be 1 in 3,440 to 1 in 56,000 [1].

We are reporting one such uncommon postoperative complication that occurred following cesarean section together with a discussion on the means of its early diagnosis and prevention.

Case

B.C. P1+0, LCB 10 years back, with postcesarean section pregnancy with scar tenderness underwent emergency

Cesarean Section under spinal anesthesia at around 6.00 a.m. on December 30, 2000. She underwent laparotomy 6 h later under general anesthesia with features of hemoperitoneum and shock. A broad ligament hematoma on the left side was drained, and a subtotal hysterectomy performed. She was transfused blood and put on sedatives.

Next morning (i.e., around 14–16 h after the laparotomy), she complained of paresthesia, weakness, and swelling of the left hand and fingers. On examination, there was a mottled bluish discoloration and swelling of her left hand sparing the thumb, distal to the intravenous line situated on the dorsum of her left hand. She could perceive pain and move her fingers. The radial and brachial pulses were palpable and of good volume (Fig. 1).

There was no prior history of pain, tingling or numbness of her fingers, no evidence of thoracic outlet syndrome, or features suggestive of collagen vascular disorders or systemic sclerosis, diabetes mellitus, atherosclerosis, vasculitides, and hypercoagulable states. She was not on any long-term medication (special reference to migraine was made to rule out ergotism).

It was thus a case of acute severe peripheral vascular compromise developing postoperatively.

The cardio-thoracic surgeon attributed this to inadvertent intra-arterial injection of drugs, the suggestion being pentothal sodium [2] and promethazine both of which had been used during operation.

She was advised hot compress and to keep her forearm elevated for the edema to subside and prescribed LMW Heparin injection 2,500 IU s.c. thrice daily, pentoxifylline

Adhikari S., Associate Professor · Datta M., Assistant Professor
Department of Obstetrics & Gynaecology,
Medical College & Hospitals, Calcutta, 88, College Street,
Kolkata 700 073, India

Dasgupta M. (✉), Assistant Professor
Department of Obstetrics & Gynaecology,
Medical College & Hospitals, Calcutta, 559, Block N,
New Alipore, Kolkata 700 053, India
e-mail: mandiradasgupta@hotmail.com

Fig. 1 Fourteen hours after the laparotomy—the left hand initially was swollen, with mottled bluish discoloration of four fingers without involving the thumb

400 mg thrice daily, and trypsin and chymotrypsin with 1,00,000 IU enzymatic activity thrice daily. In addition to this, she received routine postoperative antibiotics and analgesics.

The next day large bullae appeared on her hand, which refilled after puncture and aspiration and spontaneously ruptured in 2–3 days' time leaving raw areas behind that healed after proper antiseptic dressing. Within a fortnight, her fingers gradually stiffened.

In spite of physiotherapy, she gradually developed ischemic contracture with wasting of the small muscles of the hand. A line of demarcation appeared on four fingers at the midphalangeal joints (there was no involvement of the thumb). The terminal phalanges and nails turned black (Figs. 2, 3). The skin gradually sloughed out. With ongoing hydrotherapy, she regained partial mobility of her fingers, but adduction and abduction of phalanges including thumb remained weak.

She was discharged on request 2 months later with advice to attend plastic surgery OPD weekly, but she was lost to follow up.

Fig. 2 One month: the hand has developed ischemic contracture, with wasting of the small muscles. Line of demarcation has appeared in the midphalangeal joints (palmar aspect)

Fig. 3 One month: the hand has developed ischemic contracture, with wasting of the small muscles. Line of demarcation has appeared in the midphalangeal joints (dorsal aspect)

Discussion

Most cases of unintentional IA cannulation in the forearm and hand involve radial artery and ulnar artery branches. A preexisting vascular anomaly is a risk factor commonly overlooked by health care professionals, e.g., (i) a superficial radial artery branch passing ventral to the flexor retinaculum; (ii) *antebrachialis superficialis dorsalis*, which crosses underneath a terminal branch of the cephalic vein, just superficial to the radial styloid process, a common site of cannulation—(often referred to as the *intern vein*); and (iii) variations of the superficial and the deep palmar arch.

Although most cases of unintentional arterial cannulation involve the radial artery branches, superficial ulnar arteries have been reported to be involved in 2.26–3.1 % of patients [1].

Our case involved the ulnar artery as evidenced by sparing of thumb which is supplied by *arteria princeps pollicis*, branch of radial artery, and involvement of small muscles of hand.

In iatrogenic IA injections, pain is often the initial symptom but our patient could not complain as she was under general anesthesia and in shock. Thus, those patients who are receiving mechanical ventilation, comatose, or having altered sensorium, mentally handicapped, from pediatric population, and trauma victims are often subjected to an IA dose of medication.

Indicators [1] of IA cannulation include the bright red backflow of blood into an IV catheter: the presence of pulsatile movement of blood in the IV tubing; backflow of blood into the IV tubing even with fluid bag at a level higher than catheter insertion site; “high-risk” anatomical locations where arteries and veins are close; and increase in blood pressure reading with an indwelling arterial catheter when an ipsilateral “IV” is “bloused” with fluid. However, these indicators are often equivocal or subtle. In this case,

the patient was in shock, and these indicators could not be recognized per operatively.

Thus, although the true incidence, pathophysiology, and proper treatment guidelines are not clear, it may be possible to prevent or detect immediately inadvertent IA injections by assessment of risk factors, vigilance, knowledge of the typical medications that should not be used for IA injection, and an appreciation of the devastating consequences associated with inadvertent IA injection of drugs. From a treatment standpoint, the best options are immediate recognition of the situation [2], assessment of disease progress, controlling the pain, anticoagulation,

rehabilitation, and specific therapy. Timely intervention can prevent long-term morbidity.

References

1. Sen S, Chini EN, Brown MJ. Complications after unintentional intra-arterial injection of drugs: risks, outcomes, and management strategies. *Mayo Clin Proc.* 2005;80:783–95.
2. Khan ZH, Noorbaksh S. An accidental intra-arterial injection of thiopental on the dorsum of the foot—a case report. *Acta Anaesthesiol Taiwan.* 2004;42(1):55–8.