Cardiac arrest following tourniquet release: Needs attention!

Sir,

Use of a pneumatic tourniquet to produce a bloodless surgical field places the patient at risk for complications. Here, we report unusual sudden cardiac arrest with tourniquet release after surgery.

A 58-year-old male, American Society of Anesthesiologists grade I patient was operated for right proximal tibia fracture under spinal anesthesia with 15 mg of hyperbaric bupivacaine. Spinal level achieved up to T10 dermatome in 10 min of block. After exsanguination of limb by elevating it 45° for 5 min, properly sized pneumatic tourniquet applied on right thigh with adequate cotton padding. Surgery started after inflation of tourniquet to pressure of 350 mmHg on demand of operating surgeon (200 mmHg higher than baseline systolic blood pressure of patient). Intraoperative period was uneventful. Tourniquet released after completion of surgery with inflation time of 1 h 45 min. After 5 min of tourniquet deflation, patient becomes unresponsive with a sudden drop of systolic blood pressure to 65 mmHg with HR of 40/min. Injection mephentermine 10 mg i.v and the injection atropine 0.6 mg i.v given along with 100% O₂ by mask, but patient led into cardiac arrest with ventricular fibrillation on electrocardiogram (ECG) monitor. Immediate cardio-pulmonary resuscitation (CPR) started as per guidelines and unsynchronized shock of 200 J given. With continued CPR of 15 min and one shock, ECG showed sinus tachycardia with blood pressure of 68/40 mmHg. Patient got conscious, but due to inadequate spontaneous respiration, controlled ventilation after intubation with 100% oxygen continued. For hypotension, dopamine and adrenaline infusion started. Injection soda bicarbonate given for correction of metabolic acidosis with pH of 7.23 and serum potassium of 5.9 mmol/L reported by arterial blood gases. Patient shifted to intensive care unit and continued on ventilator with inotropic support. His postoperative investigations including complete blood count, ECG, cardiac enzymes, and echocardiography were found normal. After overnight ventilation with stable vitals, patient slowly weaned off from ventilator and inotropic support. Next day he shifted to ward.

Tourniquet inflation causes ischemia to muscle tissues resulting in tissue hypoxia, acidosis, accumulation of lactate, toxic metabolites and oxygen free radicals. After deflation of a tourniquet, these products get into the circulation and causes complications like pulmonary embolism, metabolic changes, reperfusion syndrome and cardiac arrest.

In our case, most likely cause for cardiac arrest is reperfusion syndrome caused by excessive tourniquet pressure leading to sudden hypotension, metabolic acidosis and hyperkalemia after 5 min of tourniquet release. Pulmonary embolism is unlikely because of absence of specific symptoms and response of the patient to conventional management without need of specific therapy for embolism. To prevent these complications we suggest the following:

1. Use limb occlusion pressure as a reference for inflating pressure limit instead of predetermined fixed pressure range by surgeon.
2. Never exceed the safe limit of tourniquet pressure and duration, deflate the tourniquet for short intervals of 10-15 min if the safe period has elapsed.
3. Deflation of tourniquet should be done slowly, and bolus of i.v fluid should be given before deflation.
4. Aggressive monitoring during deflation time because most of the fatal complications are known to occur at this time.

In conclusion, excessive inflation pressure even for a safe period can lead to fatal complication. As anesthesiologists, we must create awareness among surgeons to follow the standard accepted guidelines for tourniquet use.

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REFERENCES
1. Tetro AM, Rudan JF. The effects of a pneumatic tourniquet on blood loss in total knee arthroplasty. Can J Surg 2001;44:33-8.
2. Broom MA, Rimmer C, Parris MR. Tourniquet-associated cardiac ischaemia in a healthy patient undergoing trauma hand surgery. Eur J Anaesthesiol 2007;24:729-30.
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3. Murphy CG, Winter DC, Bouchier-Hayes DJ. Tourniquet injuries: Pathogenesis and modalities for attenuation. Acta Orthop Belg 2005;71:635-45.
4. Cohen JD, Keslin JS, Nili M, Yosipovitch Z, Gassner S. Massive pulmonary embolism and tourniquet deflation. Anesth Analg 1994;79:583-5.
5. AORN Recommended Practices Committee. Recommended practices for the use of the pneumatic tourniquet in the perioperative practice setting. AORN J 2007;86:640-55.

Sir,

We report a case of anaesthetic management in a glucose-6-phosphate dehydrogenase (G6PD) deficient individual undergoing orthopaedic surgery. Such a case poses an anaesthetic challenge during perioperative period due to limited choice of antibiotics and analgesics, predisposition to hemolysis with local anaesthetic lignocaine. Our case had additional issues of cerebral palsy and hypocalcaemia so general anesthesia (GA) was administered.

An 11-year-old male child weighing 19 kg with G6PD deficiency and spastic cerebral palsy following neonatal hyperbilirubinemia (kernicterus) was posted for fracture femur surgery. Child had haemolytic jaundice due to chest infection at 4th year of life. Dye decolorization (qualitative test) for G6PD revealed complete deficiency. Haemogram, routine biochemical investigations and electrocardiography were normal. Serum calcium was low (5.1 mg/dl). Hypocalcaemia work up revealed low levels of ionized calcium (0.6 mmol/L), phosphorus (2.3 mg/dl) and Vitamin D3 (22 mg/ml) and elevated alkaline phosphatase level (862 IU/L). Calcium and Vitamin D3 supplements were given preoperatively. Premedication with injection cefoperazone and sulbactum 1 g, calcium gluconate 500 mg intravenously and salbutamol nebulisation was given. Standard endotracheal anesthesia was administered with appropriate intravenous doses of glycopyrrolate, midazolam, fentanyl, propofol and atracurium and maintained with oxygen, air, isoflurane. Active warming measures were used to maintain temperature. Postoperative analgesia was given with injection paracetamol and tramadol. Daily haemogram was done postsurgery for early...