Low Dose Unilateral Spinal Anaesthesia for Lower Limb Amputation in Critically Ill Patients

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SUMMARY

Patients with poorly controlled diabetes mellitus have an increased risk of lower limb infection and gangrene. In Malaysia, they frequently present late and are often in septic shock with multi-organ dysfunction. We report on two patients who presented for lower limb amputation in a desperate attempt to control sepsis and save their lives. Both patients were classified as ASA 5. Both patients had successfully undergone surgery under low dose unilateral spinal anaesthesia. The anaesthetic management of these critically ill patients in view of limited resources is discussed.

KEY WORDS:
Low Dose Spinal Anaesthesia, Diabetes Mellitus, Septic Shock With Multi-Organ Dysfunction

INTRODUCTION

Patients with poorly controlled diabetes mellitus have increased risk of lower limb infection and gangrene. In Malaysia, they often present very late. Some of them are critically ill with septic shock and multi-organ dysfunction. These patients would seek traditional treatment first and would only seek medical treatment when all else failed. These patients were referred to us for urgent amputation in desperate attempts to control sepsis and save lives.

CASE 1

The first patient was a 56-year-old Indian man with a 20 year history of diabetes mellitus, hypertension, ischaemic heart disease (IHD) with ischaemic cardiomyopathy. He developed right foot cellulitis which rapidly became gangrenous, causing him to develop congestive cardiac failure. The patient deteriorated rapidly despite medical therapy and was referred for lower limb amputation. Clinically the patient was orthopnoeic (New York Heart Association Class 4), needed to be propped up and receiving oxygen 15L/min via a high flow mask. He was disorientated, grossly oedematous and in frank congestive cardiac failure. His BP was 125/75 mmHg, PR 100/min. Echocardiography showed dilated ventricles, global hypokinesia and very poor ejection fraction of 15%. Chest X Ray showed pulmonary oedema picture and cardiomegaly.

After conferring with our orthopaedic colleagues, we agreed to proceed with surgery in a desperate attempt to control sepsis. This was the highest risk classification of ASA 5 and his family members were counselled for the hish risk anaesthesia and surgery and possibility of preoperative morbidity and mortality.

In operating theatre, invasive BP monitoring was established with cannulation of the right radial artery. A 16 G cannula was inserted to a peripheral vein and slow infusion of compound sodium lactate commenced. The patient was too breathless for central line insertion. Positioned in the right lateral position and under aseptic technique, 7.5mg of 0.5% heavy Bupivacaine was given at Lumber 3/4 level with a 25G pencil point spinal needle. The patient was kept in this position for 5 minutes. After confirming a unilateral sensory block up to T10 dermatome, surgery was allowed to proceed. The patient needed to be propped up by two pillows on top of a 20 degree reverse Trendelenberg. The patient developed hypotension BP 95/54 mmHg and Dopamine infusion 5mcg/kg/min was started. IV bolus of frusemide 40 mg was given and patient continued to receive 15L/min oxygen via a high flow mask. Below knee amputation was performed and blood loss was 300ml. Postoperatively, the patient was transferred to High Dependency Unit (HDU) due to unavailability of an ICU bed. The patient did not improve and the gangrene was noted to spread upward and he was again referred for above knee amputation three days later. He developed coagulopathy with INR 2.2 and APTT of 46.6s (control 33.5s). Fresh Frozen Plasma (FFP) and Vitamin K 10mg were given daily to correct the coagulopathy over three days but INR persisted at 2.2. As the patient was deteriorating rapidly, we agreed with our orthopaedic colleagues for second surgery. Spinal anaesthesia was performed in a similar fashion using a 26G pencil spinal needle and under FFP 4 units cover. The patient survived the above knee amputation and estimated blood loss was 200ml and a further IV bolus frusemide 40mg was given. The patient passed away the following day due to decompensated heart failure.

CASE 2

The second patient was a 54-year old Malay man with a 20 year history of poorly controlled diabetes mellitus who had developed right foot cellulitis and gangrene. He sought traditional treatment and the practitioner told him application of herbs would suffice and amputation was not necessary. He was brought back to our hospital two weeks later because of increasing drowsiness. Clinically the patient's Glasgow Coma Scale was 12/15 and was severely dehydrated. His right foot was gangrenous and had maggot infestation. The patient was in septic shock with multi-organ dysfunction including acute renal failure and toxic confusional state.

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Clinically he was febrile with temperature 39°C, BP 105/50 mmHg and HR 130/min. Blood sugar was 22mmol/L, raised blood urea 24mmol/L and creatinine 488umol/. Arterial Blood Gas (ABG) showed metabolic acidosis: pH 7.16, PO2 78mmHg, PCO2 25mmHg,BE -21 and HCO3 8mmol/L on 15L/min oxygen via a high flow mask. Coagulation profile revealed INR 1.4, APTT 46s (control 33.5). Chest X-Ray showed bilateral patchy consolidation secondary to acute lung injury (ALI). He did not improved with IV Imipenam, Insulin infusion and normal saline rehydration and was referred for urgent amputation in a desperate attempt to control sepsis.

This patient was classified as highest risk ASA 5 and the family was counselled with regard the high risk nature of the surgery and anaesthesia. Monitoring included invasive BP and central line and preloading started with 500mL gelofusine®. The patient was then positioned laterally and intrathecal 7.5mg heavy Bupivacaine was given under aseptic technique, and the patient was kept in this position for 5 minutes for unilateral block. BP drop to 85/45 mmHg and Dopamine infusion commenced at 10mcg/kg/min. Above knee amputation was performed and estimated blood loss was 500ml. One unit of packed cell and 4 units of FFP were given. Postoperatively the patient was transferred to HDU due to lack of ICU bed. The patient died two days later of overwhelming sepsis despite aggressive antibiotic and haemodialysis therapy.

DISCUSSION

These two cases demonstrate that septicaemia in diabetes mellitus can develop serious complication rapidly. Septic shock with multi-organ dysfunction such as acute renal failure (ARF), disseminated intravascular coagulopathy (DIVC), acute lung injury (ALI) and acute respiratory distress syndrome (ARDS) are well documented and associated with mortality up to 70%. Our population can present very late and these patients often have strong belief in traditional medicine and will only seek medical treatment after traditional therapy has failed, thus missing the chance for early therapy which lead to better outcome. There is a need to promote increased awareness of diabetes mellitus, its complication and the need for early treatment.

It is an anaesthetic challenge to manage this group of patients. Continuous Spinal Anaesthesia (CSA) has been advocated for high risk geriatric patients. Its benefits include: haemodynamic stability and titratibility[1]. However, in patients with septicaemic shock and multi-organ dysfunction, placement of epidural or intrathecal catheter in the presence of bacteraemia is contraindicated. It carries a risk of introducing infection to the central nervous system. It would appear that single shot spinal anaesthesia is relatively safer. More recently, low dose Bupivacaine and opiod such as fentanyl have been advocated for geriatric patients with multiple co-morbid mrdical conditions. Olofsson C *et al* reported hyperbaric bupivacaine 7.5mg with 5ug sufentanil gave reliable block for hip surgery with minimal hypotension[2]. Kararmaz A *et al* used 4 mg plain Bupivacaine with 25ug fentanyl to provide adequate anaesthesia for transurethral prostatectomy[3]. Reyes M and Pan PH reported 5mg of hyperbaric Bupivacaine was adequate for caesarean section in a morbidly obese patient[4]. We gave 7.5 mg hyperbaric Bupivacaine in both our patients after considering the likely duration of surgery. We did not give intrathecal opioid because both our patients were so ill, especially so with the second patient who was drowsy and confused because intrathecal opioid carries a small risk of respiratory depression.

Severe neurological complications can follow central neuraxial block especially in the presence of coagulopathy. Haematoma formation in a closed space such as spinal canal may result in nerve damage and paraplegia. The true incidence of neurological complications following neuraxial block is reported as 0.003% after epidural and 0.004% after spinal anaesthesia. De Tommaso et al quoted the relative risk of spinal haematoma in lumbar puncture as 1 in 200,000. However, in the presence of heparin infusion, the risk increased to 1:32,500, and if the procedure is traumatic, the risk is further increased to 1:2900[5]. Despite the risk, we felt that the benefit of spinal anaesthesia outweight the risk, especially since postoperative ICU ventilation is not available. Epidural and CSA involved the use of larger gauge needle and placement of catheter, both are high risk in septic and coagulopathic patient. We further commenced FFP infusion intraoperatively to promote clotting

CONCLUSION

Patients with diabetes and lower limb infection are at risk of developing septic shock with multi-organ dysfunction. This condition is associated with a high mortality rate especially in the case of late presentation. Low dose unilateral spinal anaesthesia seems to be able to provide adequate anaesthesia for these patients to undergo lower limb amputation in a desperate attempt to control sepsis. This technique is not recommended except in extreme circumstances and further research is needed.

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