



Original Research Paper

Anesthetic Implications of Tourniquet Application in an Elderly Patient with Undiagnosed Peripheral Vascular Disease Undergoing Proximal Tibial ORIF: A Case Report

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Abstract

Anesthetic implications, Peripheral Vascular Disease, Proximal Tibial ORIF. The use of pneumatic tourniquets in surgeries involving bones of the legs provides excellent visibilities; however, serious side effects may occur in elderly patients who have undiagnosed artery problems (peripheral vascular disease, PVD). Here, we report our experience with a 66-year-old female patient who had a closed fracture of the proximal part of the tibia and who had open reduction with internal fixation (ORIF) using a subarachnoid block and pneumatic tourniquet. During the operation, the physician noted poor pulse signals at a location below where the procedure was performed, heavily calcified arteries, and excessive blood loss, which suggested that the patient might have had hidden artery disease. Further delays in the work and the need to reverse the regional block, led to the change to general anesthesia, via lateral intubation. This situation shows how important a preoperative vascular assessment of patients may be, in addition to detailed monitoring of the patient while the surgery is being performed.

Key Word Anesthetic implications, Peripheral Vascular Disease, Proximal Tibial ORIF anesthesia as well as the complications related to airway management in the lateral position.

Introduction

Pneumatic occlusion devices (tourniquets) are often used in the surgeries done on the legs of patients because they allow surgeons to produce a bloodless field of operation [1]. Although this practice is mostly safe, the method of occlusion can have negative effects, especially in patients who have many different health problems like diabetes and high blood pressure. Patients with peripheral artery obstruction experience vascular injury because of weaknesses in their arteries when the method is used [2]. The question of how safely do continue using the tourniquet in the patients who have had any artery problems remains controversial to this day [3]. Asymptomatic disease of this kind is commonly seen in diabetic and hypertensive patients and often remains undiagnosed in the absence of any screening [4]. Here we present a case of an elderly woman diagnosed with unrecognized peripheral vascular disease, which has resulted in diagnostic dilemma during tibial ORIF, intraoperative change from spinal to general

Case presentation

A 66-year-old female was admitted with a

closed fracture of left proximal tibia and was taken for ORIF with plating. Her ASA physical status was II. She had systemic hypertension and type 2 diabetes mellitus for the last 7 years, on regular treatment. No history of claudication, rest pain or non-healing ulcer was noted and she did not have any previously diagnosed peripheral vascular disease. All baseline investigations including hematological, biochemical and coagulation profile, and ECG were normal. No vascular imaging of lower limb was done preoperatively as there was no clinical indication suggesting presence of hidden vascular disease at that time.

3 mL of 0.5% hyperbaric bupivacaine mixed with 25 mcg of fentanyl was administered in subarachnoid block for the surgery. Pneumatic tourniquet was applied to left lower limb and maintained for 90 mins. Intraoperatively surgeon has noted excessive blood loss from the limb compared to the field under the tourniquet raising

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suspicion of some underlying vascular injury. A vascular surgery consultation was called for opinion. On examination, distal pulsations in the limb were poor and the vessels were palpably calcified suggesting a diagnosis of peripheral arterial disease with acute on chronic vascular obstruction.

Due to increase in duration of the procedure along with regression of spinal block, a shift of technique to general anesthesia was decided to ensure adequate control of pain and airway for the remaining period. Since the patient was kept in a

lateral position for the purpose of providing ample surgical and vascular access, endotracheal intubation was performed with the patient in a lateral position. The surgery was then performed under adequate vascular protection along with monitoring hemodynamic parameters.

After surgery, CT angiography of left lower limb was done to analyze vascular findings. Patient started with anticoagulant therapy, and distal limb pulsations were regained after 8 hours. She had an uneventful recovery thereafter.



Figure 1. Intraoperative photograph of the left lower limb following tourniquet deflation, showing the dressed proximal tibial ORIF site and surrounding soft tissue.

Discussion

Elderly patients suffering from diabetes and high blood pressure may have hidden intense peripheral cardiovascular disease that can only be detected through bodily stress due to application of the tourniquet procedure and the surgical procedure, as confirmed by previous research examining patients with diabetes and high blood pressure [4,5]. In this case, the use of tourniquet healing procedure was deemed unnecessary due to the lack of signs of occlusive peripheral vascular disease, even though diabetic patients and patients with hypertension are at risk for developing peripheral vascular disease. Thus, it is shown that traditional health examinations may provide too few symptoms of the patient's condition when the primary concern is about the patient's cardiac and metabolic health.

Sudden or unusually high blood volume loss should arouse suspicion about possible vascular injury or occlusion of vessels [3]. In this case, emergency medical personnel discovered severely calcified cardiac arteries consistent with presence of occluding atherosclerotic disease and the possibility of the patient developing acute-on-chronic occlusive disease resulting from blood vessel blockage during

tourniquet ischemia [2]. The regression of the subarachnoid block during surgery required conversion to general anesthesia, a situation accepted as a valid occurrence if the procedure takes longer than the time limit of the block [6], and represented in aggregate data collections as a different and important reason among the group of all medical conversions from spinal to general anesthesia [7]. When converting the anesthesia, there are challenges that must be faced, including the fluctuating hemodynamics during induction and the necessity to manage the airway fast and safely. Furthermore, because of the requirement to carry out intubation in the lateral decubitus position, there were further challenges, which involved distorted anatomy of the airway and less than optimal visualization [8,9]. Therefore, proper planning, the use of airway adjuncts, and appropriate techniques to manage difficult airways are necessary in the event the scenario is expected [10, 11].

In light of this case, it is now clear that the use of tourniquets should not be applied uniformly but should be based on individual patient characteristics, including manual control, comorbidities, and expected surgical time, according to the recommendations for pneumatic tourniquet safety [2,10].

Learning Points

- Diabetic and hypertensive patients may have hidden

problems with their peripheral vascular system, which will complicate the situation after prolonged tourniquet use.

- Excessive blood loss during surgery should lead the physician to suspect damage to the vascular system.

- Converting the anesthetic from neuraxial to general anesthesia adds complexity to the process because the airway will be difficult to manage and the hemodynamics will be affected.

- In regard to tourniquet use in surgery, the application of the technique should be based on individual patient characteristics.

Conclusion

Peripheral vascular disease should be suspected in elderly patients who have diabetes or hypertension undergoing tourniquet-assisted orthopedic surgery, even in patients who show no overt signs of having vascular disease.

Consent Declaration

Informed patient consent was obtained for the publication of this case report, including the accompanying clinical image, with all identifying information removed.

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