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# Anesthesia Management of Bilateral Femoral Shaft Fracture and Left Tibiofibular Fracture for Bilateral Sign Nail and Tibiofibular Sign with Cervical Spine Injury and Epidural Hematoma: A Case Report

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## Abstract

*Preoperative evaluation by an anesthetist must be performed since 70% of patients with a femoral fracture will have an American Society of Anesthesiologists (ASA) score of III to IV. Although they occur rarely 1%-7%, bilateral femoral fractures are linked to significant morbidity and mortality. Previous reports have described anesthetic management for aged patients who have bilateral femoral fracture is difficult and require specialized team work/effort and associated with increased perioperative complications. This case emphasizes the necessity to prepare adequately and improve knowledge and awareness of anesthetic management of patients for bilateral femoral fracture and tibiofibular fracture for aged patients and needs multidisciplinary team to cooperate and increase the positive outcome of the patients. Patients with these conditions may present with various sign and symptoms that complicate the administration of anesthesia. Decisions regarding when to operate either before resuscitation or after the patient is resuscitated are one area of concern and also consider prevention of organ damage from secondary complications and maintain hemodynamic stability to ensure the anesthesia management is optimal and to increase the good outcomes of the patient.*

***Case report:*** *A 50 year old male presented with bilateral femoral shaft fracture and left tibiofibular fracture following road traffic accident and was planned for bilateral sign nail and left tibiofibular sign. Patient had cervical spine injury and epidural hematoma. Patient had undergone general anesthesia with endotracheal tube.*

***Conclusion:*** *We present a successful anesthetic management of patients who had bilateral femoral fracture and left tibiofibular fracture with cervical spine injury and epidural hematoma. We emphasize the risk of neurological injury while extending the neck during laryngoscopy for tracheal intubation due to cervical spine injuries and we preferred general anesthesia over spinal anesthesia due to spinal anesthesia is contraindicated in this patient. A detailed pre anesthetic evaluation and multidisciplinary approach as well as planning is utmost important and the anesthetic technique has to be individualized based on the patients anatomical characteristics and associated co-morbidities.*

**Keywords:** Bilateral Femoral Shaft Fracture, Anesthetic Management, Elderly, Tibiofibular, Sign Nail, Cervical Spine Injury, Hematoma, Road Traffic Accident

## 1. Introduction

Bilateral femoral fractures are relatively rare (1–7%), they are associated with high morbidity and mortality [1]. Seventy percent of patients with a femoral fracture will have an American Society of Anesthesiologists (ASA) score of 3 to 4, making preoperative assessment by an anesthetist mandatory [2]. The best treatment for bilateral femoral fractures is still debated, with few recommendations found in the literature. Acute respiratory distress syndrome (ARDS) is the most feared complication [3]. Unilateral femoral neck fracture are commonly seen in young adults after high energy injury and in elderly patients after low energy injury. Bilateral femoral neck fracture occur following road traffic accidents and high energy trauma such as fall from a height has been reported in literature but its association with low energy injuries like a fall at home and it is very rare. The anesthetic management allows for planning of anesthetic technique, assessment and communication of perioperative

risk, and pre-optimization. The Association of Anesthetists of Great Britain and Ireland (AAGBI) recommend that peripheral nerve blockade always be considered whether a spinal or general anesthesia is used.

### 1.1. Case Presentation

#### 1.1.1. Preoperatively

This is a 50 years old 60 kg male ASA III patient presented with road traffic accident when he was driving a car, he had loss of consciousness at that time and had mild traumatic brain injury, neck injury and he was on cervical collar associated to this he had blunt chest injury indicative of lung contusion and had chest pain and the pain worsen when he tried to breath and ambulate and also the patient had bleeding at the time of accident. Otherwise he has no history of chronic medical illness like diabetes mellitus, hypertension, respiratory disease, neurologic disease like epilepsy, he has no history of cigarette smoking and alcohol consumption, no history of current medication intake, no history of allergy, no history of upper respiratory tract infections, no previous history of surgery and anesthesia. On physical examination Glasgow coma scale of 13/15, the patient was acute sick looking on intranasal oxygen with 3L with pulse oximetry reading of 93% and vital sign was blood pressure 110/70 mmHg, pulse rate 93 beats per minute, respiratory rate 20 breaths per minute and temperature 36.7 oC. The patient has slightly pale conjunctiva and his mallampati score was II and difficult to assess the other airway parameters due to rigid cervical collars. During preoperative evaluation the cardiorespiratory system, genitourinary and gastrointestinal system was normal but on musculoskeletal system he had severe tenderness on both legs and had long posterior gutter on both legs. Brain CT shows there are two epidural blood collections: 1st: left parietal with a thickness of 5.5 mm, 2nd left temporal with a thickness of 6.1 mm, on cervical spine CT there is C7 left lateral mass facet transverse process fracture plus C6 left lateral mass fracture. Laboratory investigation of the patient was described below (Table 1).

Then with appropriate communication with surgical team we prepared cross match blood for intraoperative and an intensive care unit for postoperative follow up and the patient transferred from the ward to the operation room via stretcher.

| Laboratory investigation | Components | Result |
|---|---|---|
| Complete blood count | White blood cell count | $10.1x10^6$/mcL |
| | Neutrophil | 71.1% |
| | Hemoglobin | 10.7 gm/dl |
| | Hematocrit | 30.2% |
| | Platelet | 198k $mm^3$ |
| | Blood group and Rh | O positive |
| Serum electrolytes | Sodium | 127mEq/l |
| | Potassium | 4.3 mEq/l |
| | Chloride | 96 mEq/l |
| Liver function tests | Aspartate aminotransferase | 38 mmol/l |
| | Alkaline phosphatase | 65 mmol/l |
| Renal function tests | Serum creatinine | 1.2 mg/dl |
| | Blood urea nitrogen | 18.2 mg/dl |

**Table 1: Preoperative Laboratory Investigation of the Patient**

#### 1.1.2. Intraoperatively

After the patient arrived to the operation room for an indication of bilateral femoral sign nail and left distal tibiofibular sign nail an informed consent was taken and then monitors like NIBP, ECG, pulse oximetry attached and arterial line for invasive blood pressure monitoring canulated. The initial vital sign was BP: 125/70 mmHg, PR: 91 BPM, Spo2:97% then after we planned to proceed with general anesthesia with endotracheal intubation. The patient premedicated with fentanyl 100mcg, morphine 3mg, ceftriazone 1gm, after preoxygenation of the patient using 10LPM oxygen via facemask for five minutes we choice propofol 70mg and ketamine 50mg to for induction. For facilitation of intubation we used suxamethonium chloride 120mg. One anesthesia provider released the cervical collar after the patient induced and the cervical spine maintained with manual inline stabilization and intubated with endotracheal tube of 7.5 mm and laryngoscope blade of size four then the neck maintained in neutral position and the tube fixed with tape and the chest checked for bilateral breath sound then the surgery started. Anesthesia was maintained with isoflurane range from 0.5% to 1% and for muscle relaxant vecronium given with a total dose of 12 mg and then the patient also received 1g of tranexamic acid. During the intraoperative period he was hemodynamically stable and his RBS at the mid of surgery was 112 mg/dl. The patient receives a total of 2000ml normal saline and 1000 ml ringer lactate with intraoperative blood loss of around 724 ml and urine output of 1300ml. neuromuscular relaxant was reversed with atropine 1mg and neostigmine 2.5mg. For postoperative pain management land mark technique bilateral fascia iliaca compartment block (FICB) with 25 ml of 0.25% bupivacaine bilaterally and lateral approach popliteal nerve block using 20 ml of 0.25% bupivacaine given. Duration of surgery and anesthesia was 3 hours and 35 minutes and 4 hours 40 minutes respectively.

### 1.1.3. Postoperatively

At the end of the surgery the patient did not fulfill the criteria to extubate then we planned to transfer the patient to ICU with ambu bag with adequate preparation of the necessary drugs and instruments including emergency drugs and we ventilate the patient with ambu bag then the ICU was already prepared and the patient put on mechanical ventilation on pressure support ventilation (PSV) mode then the hemodynamics was normal with vital sign of BP: 108/68 mmHg, PR: 75 BPM and SPO2 of 99%. After two hours the patient tried to maintain his saturation and had adequate breathing pattern, then the patient extubated with adequate trying of his tolerance to extubation. Finally Fourteen days later he was discharged from the hospital and advised to follow up.

## 2. Discussion

Few occurrences of bilateral femoral and tibiofibular fractures have been documented in the literature, making them uncommon conditions. The most common causes of these fractures are falls from a height or high impact injuries [4]. One infrequent cause of bilateral femoral neck fractures is uncomplicated trauma [5]. In older patients, peri-operative hypotension may be linked to both spinal anesthetic and general anesthesia [6]. According to Seidel et al stated that the associated effort and requirement for expert knowledge in regional anesthesia indicates that regional anesthesia should be considered especially in cases with high anesthetic risk, suitable Sono-anatomy, and non-compromised coagulation [7]. Parker et al stated that most proximal femoral fracture patients are older, and their condition is treated surgically, requiring general anesthesia. Simple falls are typically the cause of the fracture. These patients are at a higher risk of dying after anesthesia because they frequently have numerous additional age-related medical conditions [8]. Rohini et al stated that Anesthesia for poly-trauma patients can be difficult, but the results can be improved with a multidisciplinary approach, careful preparation, and open communication within the trauma team. The degree of damage, the state of resuscitation, and any co-morbidity must all be taken into account while making perioperative treatment plans [9].

Huang et al stated that compared to elderly patients under general anesthesia, those who had femoral neck fracture surgery under fascia iliaca compartment block with total intravenous anesthesia needed fewer intensive care unit admissions, spent less time in the intensive care unit and hospital after surgery, and used less opioids afterward [10]. Chen et al stated that as compared to regional anesthesia, general anesthetic for elderly patients undergoing hip fracture surgery was linked to a higher risk of in-hospital death, acute respiratory failure, length of stay in the hospital, and readmission. For postoperative pneumonia, heart failure, acute myocardial infarction, acute renal failure, cerebrovascular accident, delirium, and deep venous thrombosis and or pulmonary embolism a significant difference was not, however, obtained [11].

Ollerton et al stated that Manual in-line stabilization (MILS) of the cervical spine is the recommended technique to immobilize the cervical spine. This entails firmly holding the patient either side of the head with the neck in the midline and the head on a firm trolley surface. Traction is not applied and the aim is to prevent any flexion or rotation of the c-spine when laryngoscopy is performed. To facilitate the airway specialist, the assistant needs to crouch by the trolley, slightly to one side, while intubation is performed. The cervical collar may be loosened or the anterior portion temporarily removed to facilitate mouth opening and application of cricoid pressure [12]. Meschino et al stated that awake intubation is preferred for such patient category and has an advantage of decreased threat of aspiration, patient protection the injury site by splinting and immediate awareness of the any worsening of the neurologic symptoms [13].

Gerbershagen et al stated all airway procedures involve some cervical spine movement; however, this movement is typically very slight, and it is uncertain if this movement is clinically meaningful in terms of impingement on the spinal cord. The cervical spine is not properly immobilized by manual in-line stabilization, which also raises the risk of tracheal intubation being difficult or unsuccessful. The benefits of awake tracheal intubation techniques in preventing secondary spinal cord injuries are not well demonstrated. An acceptable substitute method is video laryngoscopy, which seems to induce a cervical spine displacement comparable to that of flexible bronchoscope-guided tracheal intubation. Compared to video laryngoscopy, direct laryngoscopy does result in a somewhat higher degree of cervical spinal movement during tracheal intubation. Practitioners should select the tracheal intubation technique that minimizes cervical spine movement based on the clinical situation and their level of proficiency [14].

Makris et al stated that the risk of spinal epidural hematoma must be addressed if neurological symptoms emerge in the postoperative period, especially after a neuraxial blockade. This issue may have a direct or indirect relationship with the anesthetic technique [15]. Domenicucci Stated that 18% of patients who have spinal epidural hematoma caused by iatrogenic factors such as coagulopathy or spinal puncture and may aggravate the clinical conditions of patient who have epidural hematoma [16]. Gu et al stated that in aseptic revision hip and knee arthroplasty, preoperative hyponatremia was independently linked to wound complications, minor complications, pulmonary complications, organ/space infections, postoperative blood transfusions, and pneumonia, sepsis, prolonged length of stay, and sepsis complications [17].

Alexander A. et al stated that Preoperative hyponatremia was present in 7.1% of orthopedics patients and patients were typically older, were more likely to be male and had greater comorbidity and prognostic marker for perioperative 30-day morbidity and mortality [18]. Rohini D. et al stated that it can be difficult to maintain airway stability when there is face and cervical damage. A full stomach, head trauma, laryngeal injury, spinal cord damage, blood, secretions, tissue edema, and the urgency of the situation all add to the complexity of the problem. Even though it is debatable, manual in-line cervical spine stabilization should always be utilized during

laryngoscopy and intubation, or a rigid cervical collar should be employed. An airway cart that is challenging to use with a fiberoptic bronchoscope, video laryngoscopes with different blades, laryngoscopes with different sizes of blades, a surgical cricothyroidotomy set, various sized endotracheal tubes, airways, Securing the airway should ideally be done by a skilled anesthesiologist. Easily accessible alternative airway management plan should be provided. A challenging airway algorithm tailored for trauma has been made available by ASA.28 before the induction of anesthesia and during the duration of airway management, proper pre-oxygenation should be carried out, and oxygen supplementation should be continued [19].

## 3. Conclusion

In conclusion bilateral femoral fractures and tibiofibular fractures with cervical spine injury and epidural hematoma are extremely rare and may occur also in elderly patient with a specific mechanism of injury. Perioperative anesthesia management for such patient is difficult and done in multidisciplinary approach. General anesthesia for bilateral femoral fracture and tibiofibular fracture who had epidural hematoma and cervical injury is considered better than spinal anesthesia as spinal anesthesia is contraindicated in patients who have epidural hematoma and in patient who is unable to sit or to position in lateral position and thus general anesthesia is considered as anesthetic of choice for patients who had trauma to the brain and spinal cord

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