Trauma - Motor Vehicle Case Study

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Abstract: The Anesthesia Care Team involves a blend of medical expertise and meticulous coordination. Every case is a display of the preparation and the communication that is necessary between the various professionals. We will address the relation between anesthesia provider and anesthesia technologist. Each person works independently, but also as a team with a common goal to take care of our patients with the intent to save their lives. Nonetheless, in a surgical emergency with dynamic conditions, it is difficult to maintain control of the patient and their vital sign stability efficiently. This paper details a possible anesthetic plan, consideration of some complications, and the role and responsibility of the Anesthesia Technologist when a motor vehicle accident trauma case presents.

INTRODUCTION

Time is of the essence when it comes to Trauma. The commonly mentioned "Golden Hour" is an important guideline which refers to the first hour after traumatic injury. It is considered the most critical time in which treatments or interventions are most likely to be successful and effective (Sharma, 2008). Therefore, efficient trauma response is needed. Most county governments setup a rapid response system which is utilized for quick transport by the local firefighters and paramedics from the scene of the incident to the best equipped hospital with an Emergency Department Trauma response team. The patient is received by a multidisciplinary team composed of various specialist which may include members from anesthesia services, emergency services, and surgical services, among others.

Trauma is the leading cause of death for patients up to the age of forty-five (45) and is the third leading cause of death in every age group in the United States (Sharma, 2008). It is a complex environment with special considerations where decisions are made in rapid fashion. Trauma cases require consideration of truncal and appendicular body injuries, disruption of physiologic systems, often substantial amounts of blood loss, and at times undetected internal injuries. The complexity of a trauma cases is entirely dependent on the mechanism of injury, and the type of injury sustained or suspected. Close attention and fidelity of the patient's vital signs is needed during perioperative care. This case highlights the overall treatment and anesthetic care of a trauma patient injured through mechanism of motor vehicle.

CASE INTRODUCTION

A 42-year-old female, named Jane Doe, engaged in a motor vehicle accident (MVA), as a restrained driver. The offending car hit the driver's side-door at 40 mph causing a significant impact on the left side of our patient's body. The collision resulted in deployment of the front and side air bags. The field report is that Jane Doe had a brief loss of consciousness. She regained consciousness when she arrived in the emergency department. Jane's chief complaints are neck pain, back pain, dull abdominal pain, left shoulder and sharp left chest pain. Her pain score is eight (8) out of ten (10). She is having trouble breathing. Every breath requires major effort and results in considerable pain. Emergency paramedics fully immobilized Jane upon extraction from the vehicle. They placed a cervical collar and moved her on a backboard. A peripheral twenty-gage (20ga) intravenous line was inserted en route to the hospital by the paramedics. A 500ml bolus of Ringer's lactate was given.

Initial vital signs were, BP: 142/55, HR: 98 and SpO2: 88%.

An acute Trauma Survey was performed.

A second set of vitals were taken 30 minutes after arrival to the ER.

The most recent vitals are BP: 88/45, HR: 128, SpO2: 90%.

After initial evaluation, the surgical team admit Jane for an exploratory laparotomy. As far we can determine, Jane has an unremarkable medical history. She has been in general good health with no underlying conditions or systemic issues. She weighs 150 pounds and is 5'6" tall.

PRIMARY SURVEY AND CONSIDERATIONS

As anesthesia technologists, we can preliminarily suspect a few potential complications based on the circumstances. Jane's reported symptoms and her vital signs are of importance to the team's response. Working together with the anesthesia providers and surgical trauma team to aid in Janes care is the goal. The primary concern is airway management. In fact, in the initial assessments consideration of airway, breathing, circulation, disability, and exposure (ABCDE) is needed. This method is used as an early systematic approach. The American College of Surgeons developed it to improve survival of acutely injured patients. It achieved this by reducing the incidence of missed injuries. Although the emergency room trauma team typically conducts this type of evaluations and examinations, the anesthesia care team participates in assessing the respiratory system on trauma patients. Of course, this is true prior to any surgical case start. The need for a protected airway depends on the decisions made about the type of surgical intervention and its invasiveness. The anesthesia care team (ACT) offers an advanced airway skill set to patient's care. Quick recognition of physiological conditions by the ACT is complementary to the overall effectiveness of the care rendered to a patient. Indeed, the ACT is often adept at identifying various airway issues quickly due to their training and experience, which leads to swift intervention upon the use of differential diagnosis tools or schemas.

During initial assessments, the airway and cervical spine are of primary concern. The airway needs to be secured as the team aims to stabilize the patient's condition. A rapid inspection of the mouth and larynx is done to check for trauma, bleeding, penetrating injury, or foreign object obstruction. Although disoriented, Jane Doe was able to answer questions, which indicates at least for the moment a patent airway. She is subsequently monitored for signs of respiratory distress. Most often a cervical spine injury is assumed in motor vehicle accidents, hence proper precautions must be taken and maintained until unambiguous evidence proves otherwise. Additionally, Jane expressed the presence of neck pain. Despite an apparent stable airway, a cervical collar will remain in place until an injury is definitively ruled out. Nevertheless, during trauma scenarios a complete evaluation of the airway is often unlikely. This is in part due to time constraints as trauma patients require rapid interventions which may need to be addressed with haste. Indeed, the default method to protect the patient's airway is endotracheal intubation in trauma cases. The ACT will use the ASA Difficult Airway algorithm to treat acutely injured patients and protect the airway (Thim, 2012).

Oxygen exchange, airway control, and perfusion are integral to successful ventilation in critical trauma patients who often have increased oxygen demands (Thim, 2012). Jane is having a tough time breathing; she is experiencing shortness of breath with left-sided chest pain. Oxygenation status was assessed using pulse oximetry which indicated an initial peripheral saturation (SpO2) of 88%. Indeed, thirty minutes later an SpO2 reading of 90% with supplemental oxygen running at five (5) liters per minute administered via blow-by-mask. Inspection of the upper chest revealed intercostal bruising on the left side. Additionally, auscultation of her chest revealed diminished breath sounds on the left. Hyperresonance on percussion assessment was present in the left side. A chest X-ray revealed a left traumatic pneumothorax with rib fractures, consequently the trauma surgeons decided to insert a chest tube (Sharma, 2008).

Adequate circulation is an important part of normal physiology. Hence, keeping Jane's blood pressure within the normal range is necessary. The team has taken Jane's blood pressure multiple times during initial assessments. Concerns of hemorrhage due to blunt trauma needs to be determined. Palpation of central and peripheral pulses was performed to check for any circulation issues. All peripheral pulses were palpable. The patient's blood pressure and heart rate indicate hypotension with tachycardia. Our goal is to prevent any progress towards hemodynamic instability. The current concern is hypovolemic or hemorrhagic shock if the patient's condition progresses. As anesthesia technologists or technicians, we can assist by inserting or helping to insert two large-bore intravenous lines. The best choice for this situation is sixteen (16) gage short length catheters. The catheters will facilitate fluid resuscitation when necessary. An initial type and screen would be advisable. However, if her condition deteriorates a type and cross which would match the best and most compatible units to our patient would be desirable. Additionally, if a type and cross is not immediately available, we can request preemptively that the blood bank prepare type O-negative packed red blood cells (PRBCs) for administration. Eventually, a type and cross will be performed which will allow us to request fresh frozen plasma (FFP), and platelets for transfusion.

Currently, a Focused Assessment with Sonography for Trauma (FAST) exam with point of care ultrasound (POCUS) is performed due to Jane Doe's hemodynamic instability. The FAST exam is meant to identify free intraperitoneal or pericardial fluid in blunt trauma patients (Raja, 2016). Jane's FAST exam is positive. The need for computer aided tomography (CAT) scan with contrast will be a more definitive exam. Depending on the patient's acuity, this type of exam may be performed. In our caser the abdominal CT revealed only some intraperitoneal free fluid. Further blood testing will indicate any abnormalities in endocrine and cellular levels which will further guide the team in its decisions (Thim, 2012).

Continuing with our ABCDE assessments, the team expresses concern for disability due to acute trauma nature of the injuries. Although Jane had a brief loss of consciousness at the scene, she has regained consciousness but remains disoriented upon admission. Determination of neurologic deficits or spinal cord injuries are made. The most common diagnostic tools are the Glasgow-Coma scale (GCS), reflex testing, head CT scans, neurological assessments and close observation are the most common. In Jane's case her GCS score is 13= E4 V4 M5. Each facet of the score grades various systems: eyes, verbal, and motor. (Raja, 2016). A score of thirteen (13) indicates a mild head injury or concussion secondary to her motor vehicle accident. Pupil size, motor and sensory function were normal as confirmed by neurological assessment (Raja, 2016).

A full body examination with the patient undressed is needed to check for exposure and signs of occult injuries, such as cranial, facial, or long bone fractures. Our patient did not suffer exposure per se. Nonetheless, this would be a critical assessment if weather or water ways, or desert environments are part of the accident parameters. In our case, Jane communicated that she was experiencing numbness in her left upper shoulder with limited range of motion due to pain. The team diagnosed it and treated a dislocated left shoulder. The limb was splinted for immobilization and transport (Thim, 2012). On palpation, the patient exhibited tenderness of the abdomen with no guarding or rigidity (Raja, 2016). In addition to bruising in her extremities, she had a horizontal abrasion on her lower abdomen indicating a positive seatbelt sign. According to a study done by Agrawal, the presence of a seat belt sign indicates that "patients are more than twice as likely to sustain intra-abdominal injury" (Agrawal, 2013). As mentioned, the CT scan with contrast of the abdomen revealed intraperitoneal free fluid (Cunningham, 1998).

Just as the assessments are completed, the patient became further hemodynamically unstable necessitating emergency surgery. In emergency trauma cases, the anesthesia care team and surgical trauma team will quickly work through the assessments, which are usually made within an hour or less. Our goal now is to resolve the internal hemorrhage by exploratory laparotomy which address her internal injuries. The usual approach is a large midline incision of the abdomen (Dharap, 2016). The anesthesia care team will take actions to correct fluid and electrolyte imbalances, provide fluid and blood resuscitation during perioperative care to maintain perfusion. Meanwhile, other members of the anesthesia team have already prepared the operating room for use.

SETUP OF THE PROPER EQUIPMENT

Anesthesia technologists and technicians plays a key role in the preparation of necessary equipment prior to case starts. We can use our knowledge of the patient's condition as we set up for the emergency exploratory laparotomy in this case. Our setup should consider the internal bleeding which was noted upon the FAST exam. Importantly, standard monitoring of any patient vitals including electrocardiogram (ECG), non-invasive blood pressure (NIBP), pulse oximetry (SpO2), end-tidal carbon dioxide (EtCO2), temperature (Temp) and suction

are key to maintaining minimal standards of safe care.

Since Jane is hemodynamically unstable, an arterial line and central line are set up for continual monitoring of blood pressure and hemodynamics. Proper and rapid setup of the arterial line is important. Manufacturer recommendations include to flush while the heparinized saline in NOT pressurized. (ICU medical and Edwards Lifesciences manuals). Zeroing of the transducer to the phlebostatic axis is essential in the supine position. In general, the transducer should be at the level the heart, except in some neurosurgical or special scenario. An ultrasound machine has become an integral part of arterial line insertion. As we expect some hemodynamic instability, our anesthesia care practitioner decided to use a large bore central line kit. The large bore lumen will allow for better flows when administering blood or other necessary fluids. Sterile technique and scrubbing to assist for these procedures are necessary to prevent or minimize infection or contamination. As part of the invasive line set up, a fluid warmer should a routine part of our setups. However, a Belmont Rapid Infuser is a better device for massive fluid and blood administration. At minimum, the Belmont should be available in the room prior to case start. A supply of colloids and crystalloids should be maintained throughout the case duration. Fluid resuscitation of the patient and massive transfusion protocols should be followed per each facility's policies.

Furthermore, complete type and cross matching should be completed as soon as possible, and made ready for infusion. Several IV pumps with multiple channels may be needed for drug infusions. A key piece in any blood management protocol is cell salvaging. The autotransfusion machine can process blood by washing and preparing shed blood for reinfusion.

For most intubations, standard intubating methods can be used. However, in certain cases the use of a video laryngoscope could improve success. A video laryngoscope like a Glidescope should be present in the room with the appropriate blade regardless of the case type. Indeed, since a suspicion of cervical spine injury was noted, Jane can be considered a difficult airway. Thus, the Difficult Airway cart needs to be ready for use. A fiberoptic scope may be need since Jane is in immobilized with a cervical collar. The use a bougie can assist the intubation if the provider requests it. For most trauma cases, larger endotracheal tubes are used. The consideration of larger endotracheal tubes is made for better post operative management of ventilation. A 7.5mm ETT or larger may be a good fit for this case. Proper check of the endotracheal tube cuff with a 10-cc syringe is necessary.

Since this is a trauma case, we can count on a rapid sequence induction. A bag-valve-bag should be in the room and within reach besides the anesthesia gas machine for ventilation. Proper use of Sellick's maneuver (cricoid pressure) is recommended. Certainly, depth of anesthesia monitoring is problematic in trauma patients. The use of Bispectral Index (BIS) or SedLine (DSA) monitoring can help monitor this issue; however, its use is optional. Also, neuromuscular blockade monitoring is essential and must be present in the room (Mahmood, 2014).

Furthermore, a thorough setup must include all necessary emergency resuscitation equipment. It should be on easily accessible in case the patient's condition devolves to a life threating arrhythmia or full cardiac arrest. This includes an emergency crash cart with a functional defibrillator, the cart must include emergency medications, preferably in pre-filled syringes. The specific medications will vary between hospitals, but the list should closely follow the accepted American Heart Association or American Red Cross ACLS or ALS guidelines. These emergency medications often include atropine, amiodarone, lidocaine, epinephrine, nitroglycerine, albuterol, adenosine, and ephedrine among others (Becker, 2014). Often these emergency medications are located near the top drawer of the anesthesia drug cart for easy access.

Another important preparation step is the mandatory anesthesia gas machine Food and Drug Administration (FDA) checkouts. These checks MUST be done at the start of each day or every 24-hour period. Moreover, circuit checks between cases validate integrity of a new circuit for the next patient. Manufacturer's user manuals recommend repeating the FDA check before the 24-hour period if the circuit type is changed, i.e., changing from circle to non-circle and changing circuit size (adult vs. pediatric). Proper function of the ventilator includes vaporizer checks. In many facilities it is the anesthesia technologists' or technicians' responsibility to fill vaporizers. Regardless, checking the fill level of vaporizers should be routine, and we should inform the anesthesia care provider of their status. If the task is within the purview of the technologist/technician per hospital policy, then proceeding with refills as necessary using the proper safeguards to minimize exposure to other personnel is necessary.

Remember that there is a maximum exposure limit with volatile and non-volatile anesthetic gases. Volatile gases such as sevoflurane, isoflurane and desflurane have a limit of five (5) part per million (ppm), and Nitrous Oxide (a non-volatile gas) has a limit of twenty-five (25) ppm at all anesthetic locations.

ANESTHETIC PLAN

The goal of an anesthetic plan is to provide the needed care per the patient condition and surgery type. In Jane's case our plan must include control her fluid status and protecting her vitals while aiding the control of any internal hemorrhage. By extension this means that the team must maintain hemodynamic stability. Using the proper medications and proper techniques are part of the predetermined anesthesia care plan. Jane needs to have an exploratory laparotomy. This informs us that a midline incision of the abdomen will be performed. Nonetheless, the anesthesia plan must consider preoperative, intraoperative, and postoperative concerns.

The plan must consider preoperative medications. Often drugs like ondansetron for emesis control, fentanyl for pain control, and midazolam for anxiety are considered by the care providers. However, all medications have secondary effect which will impact the drug's dosing and use. The anesthesia provider carefully decides the drugs they will use for the patient. The primary consideration is prevention of aspiration and achieving intubation by the safest method. Jane's case demands the use of a rapid sequence induction (RSI) since her last meal was less than 6 hours ago. Aspiration prophylaxis will make induction safer but never 100%. The use of drugs like metoclopramide, ondansetron, and omeprazole may be helpful.

Once in the OR, Jane received 100% oxygen by face mask prior to induction for at least five (5) minutes. This is done to increase Jane's oxygen reserve. Simultaneously, the standard monitors are connected. As mentioned earlier these include NIBP, SpO2, ECG, EtCO2, and temperature. Once the first set of vitals are determined, the patient is induced.

In our case, the rapid sequence induction (RSI) is achieved using a combination of ketamine, propofol and succinylcholine administered sequentially. The use of ketamine at induction decreases the dose of subsequent doses of propofol for maintenance. The provider made this choice to avoid any cardiac depression and help manage the patient's hemodynamics. During RSI, the anesthesia technologist applies cricoid pressure. Care must be taken to not release the pressure during the entire intubation attempt to prevent aspiration. Due to the presumed cervical spine instability, the difficult airway protocol will be used. The patient is positioned in supine position with arms abducted 90 degrees. A nasogastric tube and urinary catheter are inserted to drain the stomach and bladder. Removal of stomach contents will significantly reduce the risk of aspiration upon emergence, yet sometimes this is done before induction. The draining of the urinary bladder might help the surgeon to have better visualization of internal structures thereby reducing risks of surgical puncture or unintended injury.

In addition, manual axial in-line traction for intubation will be used in conjunction with a video laryngoscope (Glidescope, McGrath, etc.) in efforts to prevent movement of the neck. This procedure needs more than two (2) people. Usually, one person will hold the patient's head, another intubates, and the team member person assist the person intubating. A bougie might aid intubation. Once the glottis has been accessed, a cuffed endotracheal tube of the proper size will be placed. As mentioned earlier, the correct size will be determined based on postoperative needs and patient anatomy. Once the endotracheal tube is in place, the cuff is inflated, and bilateral breath sounds are confirmed along with clear EtCO2 tracing confirming ventilation of the lungs.

Our next task would be to assist the anesthesia provider with arterial and central line placement using sterile technique, this may or may not be part of your job description. In my current work environment, we participate in these invasive procedures. Certainly, an ultrasound is used to guide both these type of catheters into the correct vessel. The arterial line was inserted into the left radial artery, and the central line into the right internal jugular vein. These invasive lines will help the provider to quickly identify hemodynamic changes.

In our case, Jane's maintenance is achieved with a combination of sevoflurane, and rocuronium as muscle relaxant, and ketamine with the use of some opiates for pain control. However, there are many ways in which maintenance can be achieved. Intravenous fluids (crystalloids or colloids) are given according to the patient's central venous pressure and hemodynamic stability. Homeostasis is desirable but often difficult to maintain in trauma cases. Fluid status is managed via administration or withholding of blood, fluids, and medications. Often lower blood pressures are allowed to reduce intraoperative bleeding, but not at the expense of perfusion. Jane remains hemodynamically stable throughout the surgery by careful management of fluids and administration of vasoactive drugs (Bharati, 2013).

Often during trauma cases, rapid laboratory results are needed. Point of Care Testing (POCT) often addresses this concern. Monitoring acid-base balance, hemoglobin levels, carbon dioxide levels, and bicarbonate are crucial for the anesthesia care provider to make clinical decisions. Specialized test like INRs, coagulation studies (aPTT, PT, clotting times, etc.), electrolyte levels must be trended and treated for any abnormalities. Antiarrhythmic drugs such as

amiodarone, and lidocaine are needed to control labile blood pressures. Vasopressors, vasoconstrictors like epinephrine, dopamine, esmolol, and others are needed. (Bharati, 2013).

Blood transfusions are often necessary. Blood products are administered when needed as mentioned. However, Jane needed this blood due to devascularization of the bowel and shearing of the mesenteric artery resulting in pooling of blood within the peritoneal cavity (Sengar, 2016). The surgical team performed primary repair and resection with anastomosis with a stoma to stop the bleeding. The use of a cell saver was not chosen due to the potential contamination by intestinal contents.

Emergence consists of discontinuation of inhalational gas flow, and administration of muscle relaxant reversal like Sugammadex. Jane will be sedated during transport as she will be transported intubated to the ICU for post-operative monitoring.

POTENTIAL COMPLICATIONS DURING PERI-OPERATIVE ANESTHESIA

The patient had a chest tube inserted prior to surgery due to her left thorax injuries. Caution must be taken to avoid dislodgement of the chest tube which is a problematic possibility. We predicted uncontrolled bleeding and potential hemorrhage leading to hemorrhagic shock. The initial assessments of Jane displayed free fluid in the peritoneal cavity by CT scan. The extent and degree of internal injury correlates with the amount of potential blood loss. In the case of hemorrhagic shock, a call for help from others is necessary. Use of a rapid infuser is required to address this type of situation. The anesthesia care provider will give FiO2 100% and turn down volatile anesthetics as the BP drops. Current guidelines suggest that blood products be given in a one-to-one ratio. One unit of fresh frozen plasma (FFP) to a unit of packed red blood cells (PRBC) to one unit of platelets. Initial availability must be addressed early, and units should be available in the operating room.

Hypothermia is often a hidden problem for trauma patients. They should actively be kept warm. Blood will not clot normally is temperatures are too low or too high. Tranexamic acid, aminocaproic acid, and calcium will help our bleeding patients by limiting fibrinolysis. Electrolyte imbalances need to be treated quickly. Hypocalcemia and hypomagnesemia can be addressed with administration of the proper electrolyte. Yet, hypernatremia and hyponatremia are dangerous to the patient if we administer several liters of normal saline as this may cause hyperchloremia or an anion gap metabolic acidosis if this common crystalloid is overused. On the other hand, hyperkalemia can happen and cause cardiac issues. It can be treated with calcium chloride, insulin, and sodium bicarbonate.

In addition, complications with the chest tube are possible, including tube kinking or clotting, leakage around the chest tube, unintended tube dislodgement, re-expansion pulmonary edema, or insertion site infection (Kwiatt, 2014).

POST-OPERATIVE CARE

Pain management is of high importance in post-operative care of all patients. Procedures that could help reduce pain, like epidurals and nerve blocks, are sometimes impractical or impossible in trauma patients depending on the injury or speed of surgical intervention. Parenteral opioids are a standard first-line pain control tool. Use of narcotics is often the primary method of pain management (Fabbri, 2023). If the patient is stable pain control procedures can be attempted within a brief period after surgical care. Indeed, multimodal approaches are the most advocated therapies for pain in trauma patients (Klugh, 2024).

According to a study, respiratory complications and surgical site infections account for most post-operative complications. Therefore, wound infections are a common complication associated with exploratory laparotomy, a surgery that involves a large surgical incision. An appropriate antibiotic prophylaxis helps to decrease risk of surgical site infection. Negative pressure wound therapy is also used in healing of the abdominal incision site in the post-operative period (Dharap, 2016).

CONCLUSION

Although seatbelts have significantly reduced injury and mortality of patients in motor vehicle accidents, drivers restrained by seatbelts are prone to blunt trauma injuries of the abdomen and chest. These injuries are often sustained when the driver is subject to rapid deceleration. Abdominal injuries sustained by mechanism of restrained seatbelt in MVA can be life threatening and challenging to diagnose. Thus, the presence of a seatbelt sign should raise suspicion of a significant intra-abdominal injury. Due to proper examination and diagnostic testing, clinicians our team was able to quickly diagnose and treat the patient. It is critical to reduce morbidity and mortality in blunt trauma patients to tend to these injuries efficiently. Studies indicate that delays of 8 to 12 hours in diagnosing abdominal injury could increase morbidity and mortality leading to severe complication and risk for sepsis (Sengar, 2016). Although injuries such as mesenteric sheer injury are rare, prompt diagnosis and surgical treatment are of

paramount importance in preventing further complications as mentioned.

In this case, the Acute Trauma Life Support protocol (ABCDE) allowed clinicians to examine and identify occult injuries related to the blunt trauma. The patient was diagnosed with a left pneumothorax, and a chest tube was placed. Jane also had a left shoulder dislocation, which was splinted and immobilized. The FAST exam was positive, and CT abdomen revealed intraperitoneal free fluids. The physical exam revealed a tender abdomen and a positive seatbelt sign. As Jane became hemodynamically unstable the need for emergent exploratory laparotomy was necessary. Surgical exploration revealed a devascularization of the bowel and mesenteric artery injury. A primary repair and resection with stoma were performed with a re-anastomosis to be performed later (Sengar, 2016).

Trauma cases can be demanding. In these cases, the anesthesia technologist must be able to communicate, anticipate, and be ready to render help during various phases of care. The anesthesia care plan includes procedures and pieces of equipment that must be understood, and the technologist and technician must have knowledge about. Preparation, RSIs, line insertions, hemodynamics and POCT testing all were part of this case among other functions that contributed to a favorable outcome (Vailas, 2015).

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Continuing Education Quiz

To test your knowledge on this issue's article, provide correct answers to the following questions on the form below. Follow the instructions carefully.

1. Which type of equipment will be used in a trauma motor vehicle accident difficult intubation scenario which is complicated by an unstable cervical spine? (Choose TWO)
A) Macintosh blades
B) McCoy (Flex-tip) blades
C) Fiberoptic scope
D) Video Laryngoscope

2. Most trauma cases need to be considered to have a full stomach, therefore it is necessary to consider the use of _____.
A) Long-acting muscle relaxants
B) Rapid Sequence Induction
C) Spinal Anesthesia
D) Nerve blocks

3. Point of Care testing is important during trauma because it provides _____ values that inform the anesthesia care provider about the patient's condition. (Choose TWO)
A) Hemoglobin
B) coagulation studies (aPTT, PT, etc.)
C) pH levels
D) crossmatch for blood type

4. Which of the following is often a hidden problem that trauma patients endure?
A) hypertension
B) hypothermia
C) fibrinolysis
D) oxygenation

5. To prevent aspiration during induction of anesthesia, which of the following medications is often used to minimize the risk?
A) calcium gluconate
B) ketamine
C) metoclopramide
D) succinylcholine

6. The maximum exposure limit of volatile anesthetic agents, like sevoflurane and isoflurane, is _____ parts per million.
A) 2
B) 5
C) 10
D) 25

7. Focused Assessment with Sonography for Trauma (FAST) exam with point of care ultrasound (POCUS) are meant to identify _____.
A) good veins to access for CV catheters
B) difficult airway problems
C) free intraperitoneal or pericardial fluid
D) the need for a CT scan

8. ABCDE assessments were developed by the American College of Surgeons to improve the _____.
A) detection of intubation problems
B) survival of acutely injured patients
C) access to resources in trauma hospitals
D) reduction of unnecessary tests and medications

9. Trauma is the leading cause of death for patients up to the age of _____.
A) 25
B) 35
C) 45
D) 55

10. Which of the following is the primary method of pain management?
A) epidurals
B) IV narcotics
C) nerve blocks
D) nonsteroidal anti-inflammatories

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