DIABETIC FOOT WITH SEPTIC SHOCK FOR AMPUTATION – ANAESTHETIC MANAGEMENT

Dr.S.Saravanababu,
Salem

CASE HISTORY : -

You are called to assess a 50 year male with gangrenous left lower limb being planned for emergency above knee amputation.

On a quick assessment he in responding to voice with confused speech.

His vital signs are

RR --→ 35/ min

PR --→ 140/ min

BP --→ 70/40MM Hg

The pulse oximeter is not picking up a signal.

He is pale and peripheries are cold with a capillary refill time of 5 seconds. His attenders do not know when he last passed urine.

Provisional diagnosis:-

The patient has septic shock.

Next step would be to give

1. Oxygen
2. Fluid resuscitation
3. IV antibiotics

Oxygen ----→ 5l/min through a tight fitting face mask.

Fluids ----→ Insert two 14 G venflon and start fluid resuscitiation with NS as fast as possible (around 20 – 30ml / kg).

Further history from the attenders reveal that the patient had a small ulcer in the leg 1 week before for which he took some native treatment. The ulcer did not subside and now the local examination reveals a necrotising ulcer with extensive soft tissue infection with loss of vascularity.

Previous medical history reveals that the patient is a known case of insulin dependent diabetes mellitus for the past 10 years. NO other significant past medical history.

Final Diagnosis :-

A diabetic patient in septic shock with gangrenous left lower limb being planned for above knee amputation.

Next step would be to start IV antibiotics.

But before that take blood for culture and sensitivity and other tests like CBC, Urea, Creatinine, Electrolytes and Glucose.

Administer

IV piperacillin + Tazobactum 4.5 gm 8^{th} hrly

IV Metronidazole 500mg IV 8^{th} hrly

IV amikacin 500mg IV stat (Further dose depending on renal function)

Shift the patient to recovery or ICU.

Frequent nursing observations at least every 15 minutes for

- Respiratory rate
- Heart rate
- Blood pressure
- Oxygen saturation
- Urine output
- Conscious level
- ECG
- Temperature

After one hour patient has had 2 litres of normal saline.

Vitals are

- RR ----- 35/min
- SPO2 ------ 96% on 5L/ min of O2
- HR ----- 130/min
- BP ----- 80/40 mm of Hg
- Capillary refill ---- 2 seconds

He is drowsy but now oriented. A catheter has been inserted draining a small amount of dark urine. His temperature is 39^0C.

Send urine for routine analysis and Ketone bodies.

Next Step :-

While awaiting blood results give 500ml of NS and assess the response to the bolus. Now

HR 120/min

BP 80/40 mmHg

Capillary refill < 2 seconds with warm peripheries

He passes 15 ml of urine.

Blood Test Results have now come : -

Hb : 12g%

WBC : 30000/cumm

Platelets : 90000/cumm

Urea : 70mg/dl

Creatinine : 1.8mg/dl

Blood glucose :520mg/dl

Nat : 150meq/l

KT : 4.5meq/l

Cl- : 110meq/l

HCO3 :15meq/l

Urine ----- Presence of Ketone bodies.

Interpretation of the results

High WCC --- consistent with infection.

Low platelets ---- occurs in severe sepsis

Relatively raised

Hemoglobin

Urea } Reflect dehydration

Sodium

Low bicarbonate and raised Anion gap } Suggest metabolic acidosis probably lactic acidosis

High blood sugar + Presence of ketone bodies in Urine — suggest diabetic ketoacidosis

Arriving at a complete diagnosis . We have a diabetic ketoacidotic patient in septic shock not responding to fluid challenge.

Further management is directed at improving his blood pressure and controlling his diabetic ketoacidotic state.

Managing septic shock:-

It is 2 hours since admission. Patient has received 3l of NS with no further improvement in his blood pressure. BP is still 80/40mmHg. He remains hypotensive with a low urine output.

Next step is to start an inotrope ; preferably norepinephrine 5mg in 500 ml of NS through a paediatric set (60 drops/ml) at 30 drops/min. via a separate cannula in the antecubital fossa.

BP : 130/70 mmhg
HR : 110/mt
SPO2 :98% on 5l/min of O2
Capillary refill : <2s
Urine output :100 ml/hr

Managing diabetic keto acidosis:-

Get a specialist help if not available proceed with the following steps.

1. Correction of fluid loss with intravenous fluids which is already being done.
2. Correction of hyperglycemia with insulin.
   a. Insulin should be started about an hour after IV fluid replacement.
   b. Use only low dose insulin it has the advantage of not inducing severe hypoglycemia or hypokalemia seen with high dose insulin.
   c. Use only short acting insulin.
   d. Only IV route is advisable
   e. Infusion:-
      60 u of insulin in 500ml of NS infuse at the rate of 50ml/hr (6 units / Hr)
   f. Optimal rate of glucose decline in 100mg/dl/hr.
   g. Do not allow the blood glucose to fall below 200mg/dl during the first 4-5 hours of treatment.

Hypoglycemia may develop rapidly with correction of keto acidosis.

Rapid fall in blood sugar has two hazards

1. Rebound ketosis
2. Cerebral edema

Correcting Electrolytes:-

a. If K+ level is > 6 meq/l no treatment
b. K+ level is 4.5 - 6meq/l add 10 meq/ l of KCl
c. K+ level is 3 – 4.5 meq/ l add 20 meq/l of KCL

Monitor serum potassium levels hrly. Infusion to be stopped if K+ > 5 meq/L

Correcting Acidosis:-

Bicarbonate typically is not replaced as acidosis will improve with the above treatment. Rapid and early correction of acidosis with sodium bicarbonate may worsen hypokalemia and cause paradoxical cellular acidosis.

It is 4 hours since admission. Patient is reassessed.

Patient is now conscious, oriented PR-102/min, BP-110/70 mmHg on inotropes, SPO2-98% on 5l of O2 and urine output 250ml.

Now the patient has to be taken up for above knee amputation.

ANAETHETIC MANAGEMENT

Pre-operative concerns:-

Septic patients portray unstable hemodynamics because of hypotension or cardiomyopathy caused by vasodilatation. It impairs global tissue perfusion and oxygenation threatening functions of critical organs.

The immediate goal is to achieve adequate control of source of infection with the least physiological embrassment.

Clear and timely communication between the anaesthetist, surgeon and physician is essential for rapid implementation of an effective treatment plan which can be discussed with the patient and their family. It is vital that the anaesthetist assumes a central role in the multidisciplinary team. The anaesthestic must have a precise anaesthestic plan based on a

thorough preanaesthetic evaluation because many cases are emergent. These procedures are done out of hours. Make sure you have appropriate help available in the OT.

Checklist For Intubation:-

Monitors :-

SPO_2

BP

ECG

Assistant to feel pulse.

Assistants :-

One or preferrably two for cricoid pressure and assistance check they know what you expect them to do.

Pre-oxygenation:-

Deliver as much oxygen as possible via anaesthetic circuits

IV Access:-

Large drip running freely, fluid resuscitation in progress.

Equipments:-

2 working laryngoscopes with blades of different sizes, ETT of correct size + 1 size smaller. Cuffs checked, Guedel arway. Gum elastic bougie / stillet stethoscope to check tube position.

Suction switched on and within reach. Tape to secure ET tube.

Drugs for intubation & resuscitation.

Intra operative Management:-

To provide safe and optimal care for critically ill septic patient . Maintain the correct schedule of intraoperative antibiotic therapy.

GENERAL ANAESTHESIA AND CONTROLLED VENTILATION

Induction of anaesthesia and initiation of mechanical ventilation:-

1. Denitrogenation of the lungs breathing 100% O2 through a tightly fitted facemask for upto 3 minutes is a must.
2. Induction of anaesthesia is ideally a deliberate stepwise process using small doses of IV anaesthetic agents titrated to clinical response.
3. The choice of induction agent and narcotic is less important than the care with which they are administered.
4. Induction can be done with fentanyl and ketamine titrated to clinical response. They provide some degree of hemodynamic stability.
5. Tracheal intubation can be facilitated by scoline by rapid sequence induction.
6. Intermediate acting vecuronium can be used as the muscle relaxant.
7. Continued volume resuscitation and incremental doses of vasopressors are helpful to counteract the hypotensive effect of anaesthetic agents and positive pressure mechanical ventilation.
8. The goal of mechanically ventilating patients with severe sepsis is to use sufficiently high FiO2 to maintain adequate oxygenation.
9. Low tidal volume ventilator strategy to minimize the impact of positive pressure ventilation on the lung tissue and also on venous return and cardiac output.
10. Protective lung strategies:-
    a. High FiO2 until SPO_2 is atleast 90%
    b. Incrementally increasing PEEP
    c. Permissive hypercapnia.
11. Maintenance of stable concentrations of anaesthetic agents in the brain may be more reliably achieved when using intravenous rather than inhalation agents.
12. Avoid intraoperative hypothermia as it is associated with impaired platelet and coagulation factor dysfunction

End of surgical procedure:-

1. The rate of blood loss must be minimal before leaving the OT.
2. In severly ill patients postop ventilation will be helpful.
3. Safe transfer of the patient to ICU is essential

Focussed handover report to the ICU or Postoperative ward highlighting

- Clinical presentation
- Response to resuscitation measures
- Antimicrobial agents used.
- Details of surgical procedure
- Blood products used intra operatively
- Problems to be expected in postop period

Role of peripheral nerve blocks : -

Effective at minimizing the sympathetic response to a painful stimulus avoids the systemic effects of opioids

Contraindicated

1. In the presence of coagulopathy
2. Local or systemic spread of infection
3. Local anaesthetics may not work properly in the presence of infection or acidosis may limit its application.

Neuraxial Blocks:-

Spinal and epidural anesthesia not advisable.

The hemodynamic effects of these techniques in the setting of septic induced cardiovascular compromise may be difficult to reverse.

Conclusion : -

Severe sepsis is a major health care issue with a persistently high mortality. In patients with severe sepsis requiring surgery the anaethetist has a crucially important role in coordinating and delivering resuscitation and therapeutic strategies to optimize patient survival outcome

DR. S. SARAVANA BABU MD. (ANAES)

MBBS- MADRAS MEDICAL COLLEGE

MD ANAESTHESIA – TANJORE MEDICAL COLLEGE

REGISTRATION NUMBER : 57342 – TAMIL NADU STATE MEDICAL COUNCIL

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