SHOCK IN OBSTETRICS AND GYNAECOLOGY

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INTRODUCTION

- *Shock is a state of hypoperfusion associated with haemodynamic abnormalities leading to the collapse of homeostasis, or as poetically stated by John Collins Warren, a* ***'momentary pause in the act of death'***

Warren JC. *Surgical Pathology and Therapeutics.* Philadelphia:Lea & Febiger, 1895

INTRODUCTION

- Types of shock state
  - Hypovolaemic (mostly haemorrhagic)
  - Cardiogenic - myocardiac infarction
  - Septic - bacterial endotoxaemia
  - Neurogenic - vasomotor inadequacy
  - Anaphylactic - excessive immunologic response.

OBSTETRIC HAEMORRHAGE is blood loss or bleeding during pregnancy; labour and within 42 days of termination of pregnancy

AETIOLOGICAL FACTORS OF OBSTETRIC HAEMORRHAGIC SHOCK

- **Before delivery**
  - Ectopic pregnancy;GTD (H. mole)
  - Abortion ;APH (abruption, praevia)
- **After delivery- PPH**
  - Uterine Atony;Retained products of conception
  - Genital tract Laceration;Uterine rupture

Pathophysiology of haemorrhagic shock

- A decrease in mean systemic filling pressure leads to decrease in venous return to the heart
- Decrease in cardiac output – results in shock when it falls below 40% of normal
- Loss of compensatory mechanisms
- At the cellular level – hypoperfussion cause cellular hypoxia. This cause a shift from aerobic to anaerobic metabolism causing metabolic acidosis

The stages of shock

- *There are three stages of shock:*
  - *Stage I - Compensated, or non-progressive*
  - *Stage II - Decompensated or progressive*
  - *Stage III - Irreversible*

- ***In Stage I of shock***
  - *The result is that the **heart** beats faster*
  - *The blood vessels throughout the body become slightly smaller in diameter*
  - *The kidney works to retain fluid in the **circulatory system***
  - *All this serves to maximize blood flow to the most important organs and systems in the body. The person in this stage of shock has very few symptoms, and treatment can completely halt any progression*

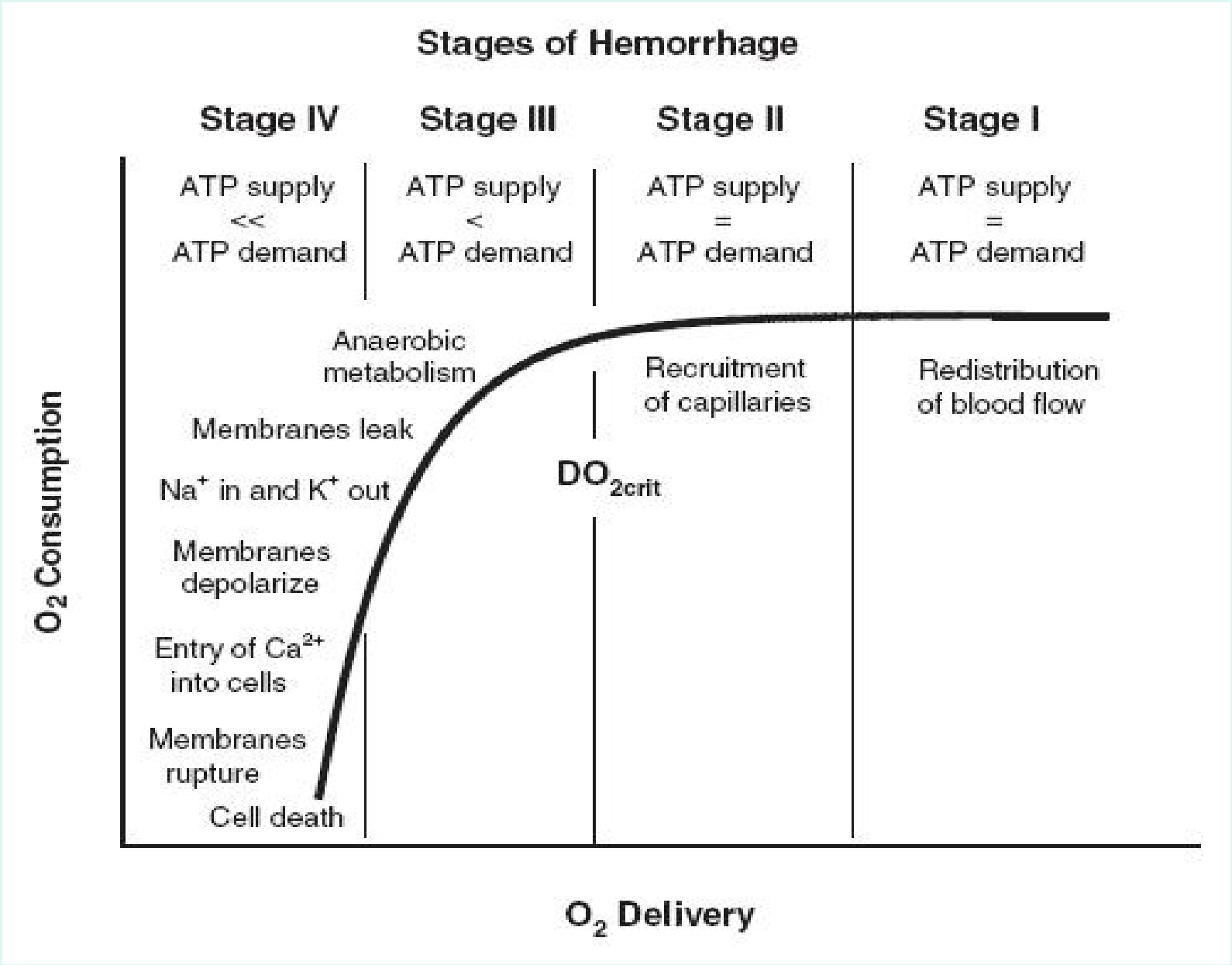
- ***In Stage II of shock***
  - *These methods of compensation begin to fail.*
  - *The systems of the body are unable to improve perfusion any longer, and the patient's symptoms reflect that fact.*
  - *Oxygen deprivation in the **brain** causes the patient to become confused and disoriented, while oxygen deprivation in the heart may cause chest **pain**.*
  - *With quick and appropriate treatment, this stage of shock can be reversed.*

- ***In Stage III of shock***
  - *The length of time that poor perfusion has existed begins to take a permanent toll on the body's organs and tissues*
  - *The heart's functioning continues to spiral downward, and the **kidneys** usually shut down completely*
  - *Cells in organs and tissues throughout the body are injured and dying*
  - *The endpoint of Stage III shock is the patient's death*

Classification of hemorrhage

Parameter	Class I	Class II	Class III	Class IV
Blood loss (ml)	<750	750–1500	1500–2000	>2000
Blood loss (%)	<15%	15–30%	30–40%	>40%
Pulse rate (beats/min)	<100	>100	>120	>140
Blood pressure	Normal	Decreased	Decreased	Decreased
Respiratory rate (breaths/min)	14–20	20–30	30–40	>35
Urine output (ml/hour)	>30	20–30	5–15	Negligible
CNS symptoms	Normal	Anxious	Confused	Lethargic

Modified from Committee on Trauma [4]. CNS = central nervous system.



EVALUATION

- Identify source of bleeding
  - Revealed – Abortion, GTD, APH, PPH
  - Concealed – Ectopic, Abruptio, PPH

EVALUATION 2…

- Estimate amount of blood loss
  - The best is to objectively measure the blood loss but, this is usually confounded by
    - Access
    - Addition of other body fluids
    - Inaccurate timing of onset

EVALUATION 3…

- Estimation of the amount of blood loss….
  - Visual estimation- notoriously inaccurate
  - Guide
    - In pregnancy, 1000 – 1500mls of blood would have been lost before decompesation
    - In late phase of shock – 25% of total blood volume is lost!
    - Systolic blood pressure

Clinical Presentation

	Early *	Late**
Mental state	Alert/Anxious	Confused
Gen. appearance	Normal and warm	Pale & cold
Blood pressure	Hypotension	Unrecordable
Respiration	Tachypnea	Tachypnea
Urinary output	30-60 ml/h	<30 ml/h

1.0 - 1.5 L,2.0 - 3.0 L acute blood loss

INVESTIGATION

- Determine the PCV
- Urgent grouping and cross matching of 4-6units of whole blood.
- Do bed side-clotting time – at intervals.
- FBC + Platelet count.
- PT/PTTK.
- E/U, Cr.
- Pelvic USS
- Urine preg test / Serum beta hCG

Management

Multidisciplinary approach – OBGYN, Anaesthetist, Haematologist, Nurse/Midwives, Laboratory Scientist etc

MANAGEMENT - "ORDER"

- **RESURCITATION**
  - **Oxygenate**
  - **Restore circulatory volume**
  - **Drug therapy**
- **EVALUATION - Further**
- **REMEDY THE BASIC PROBLEM**

RESURCITATION

- **14 gauge IV cannula - X2 but less than 18G cannula**
- Rapid infusion of 1.5-3 times the estimated blood loss to catch up the described "Golden Hour" – duration of shock before stage of irreversibility
- Aim is to achieve permissive hypovolaemic state at least –
  - MAP to ≈ 60-70mmHg or BP = 80/50 - 90/60
  - with urine output of ≥ 30 ml/h

RESURCITATION..2

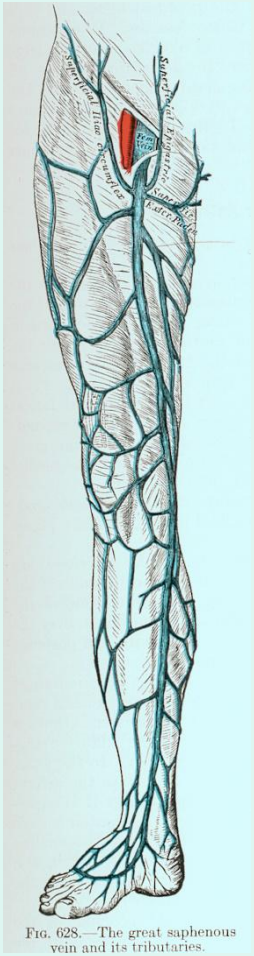


Fig. 628.—The great saphenous vein and its tributaries.

- You may need to perform a venous cut down!
- Every OBGYN specialist must be trained.

RESURCITATION…3

- **Choice of fluids**
  - **Crystalloids**
    - Ringer's Lactate – Correct the metabolic acidosis at the tissue level
    - Normal saline – Equally good – isotonic
    - Avoids dextrose containing fluids in any circumstance! – only 10% will be maintained in the intravascular space
  - **Colloids –**Albumin, Haemacel
    - Hetastarch (6%hydroxyethyl starch in 0.9% NaCl)

RESURCITATION….4

- **Which fluids?**
  - "Systematic review of RCTs – on effects of colloids compared to crystalloids as fluid resuscitation showed no advantage over each other when risk of death is used a primary outcome"
    - ***Cochrane Lib, issue 2 Oxford: Update Software 2000***
  - *Current evidence evidence shows that use of Ringers lactate, Hartmann's or Normal Saline is adequate to provide desired result.*
    - ***Hofmeyr GJ & Mohlala BKF 2001***
- ***Use of blood products***
  - ***Fresh whole blood ideal***

RESURCITATION…..5

- **Oxygenation of the patient**
  - To increase perfusion to vital organs
  - May be by either face mask (better) or intranasal catheter
  - Ensure 6 to 8 litres/hr of oxygen is delivered

RESURCITATION……6

- **Drugs**
  - **Dopamine infusion in suspected ARF to improve renal perfusion**
    - **Dosage – 1 – 5mg/kg/hr in an infusion**
    - **Effect – Stimulates both adrenergic and dopaminergic receptors.**
      - **Hemodynamic effect is dependent on the dose.**
      - **Lower doses predominantly stimulate dopaminergic receptors that in turn produce renal and mesenteric vasodilation.**
      - **Higher doses produce cardiac stimulation and renal vasodilation**
  - *Vasopressin*
    - *Has vasopressor and ADH activity.*
    - *Increases water resorption at distal renal tubular epithelium (ADH effect) and promotes smooth muscle contraction throughout the vascular bed of the renal tubular epithelium (vasopressor effects);*
    - *However, vasoconstriction also is increased in splanchnic, portal, coronary, cerebral, peripheral, pulmonary, and intrahepatic vessels.*
    - *Dosage: 0.1-0.5 U/min IV, titrate as needed; after bleeding stops, continue at same dose for 12 h and taper over 24-48 h*

DRUGS

Adrenaline

Used in protracted hypotension following adequate fluid-volume replacement. Stimulates beta1-adrenergic and alpha-adrenergic receptors, which, in turn, increase cardiac muscle contractility and heart rate, as well as vasoconstriction; result is increased systemic BP and coronary blood flow.

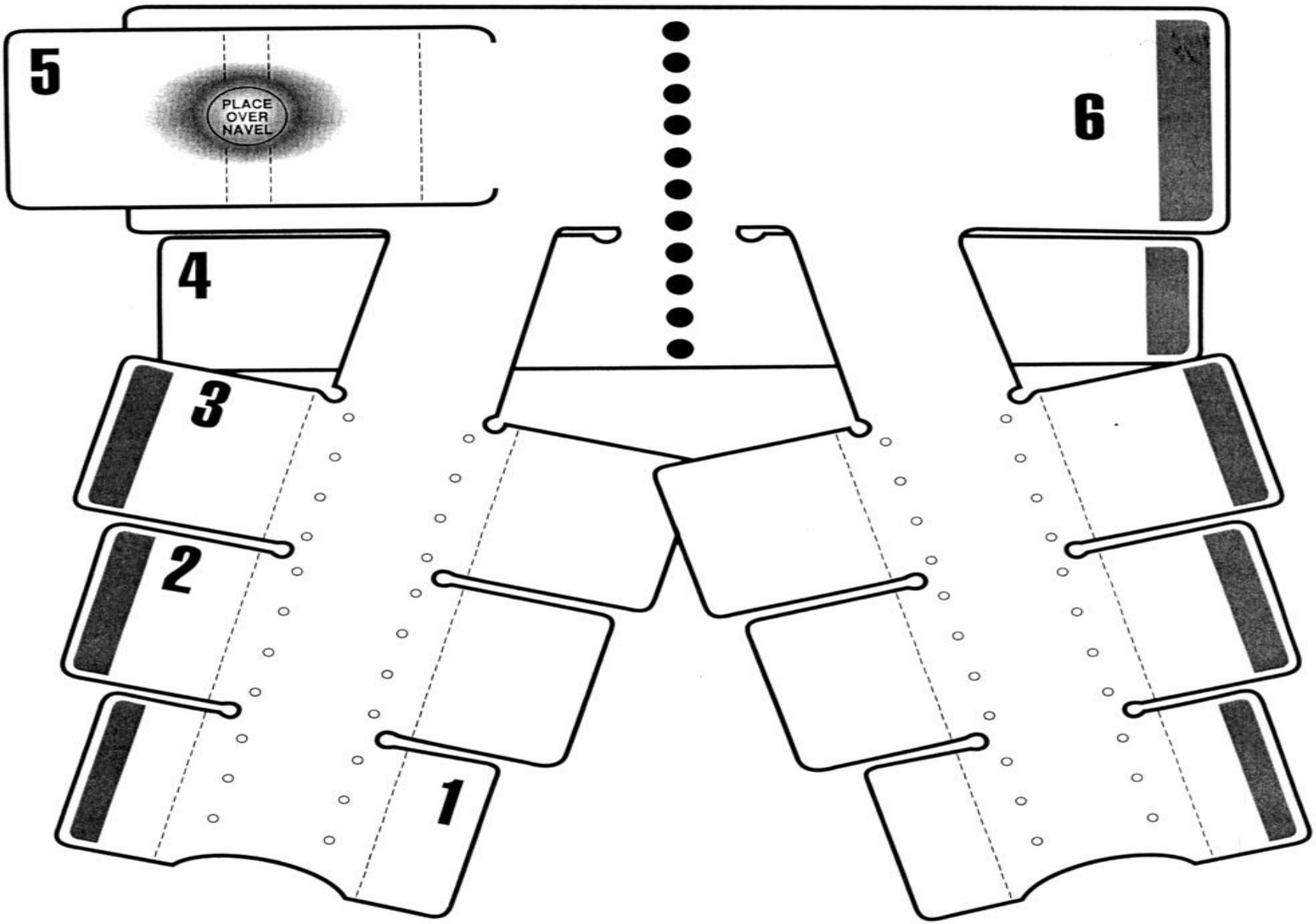
- **Adult Dose** - 2 mcg/kg/min IV; titrate to effect (low normal BP, eg, 80-100 mm Hg systolic, which is sufficient to perfuse vital organs)

- **Atropine**

NOVEL APPROACH IN MANAGEMENT OF SEVERE OBSTETRIC HAEMORRHAGE IN A LOW RESOURCE SETTING..

NON-PNEUMATIC ANTI SHOCK GARMENT (NASG)

Efficient, Simple, Safe & Easy to apply



Developed by Ralph Pelligra, MD, NASA, Ames Research

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THERAPEUTIC EFFECTS OF ANTISHOCK GARMENT

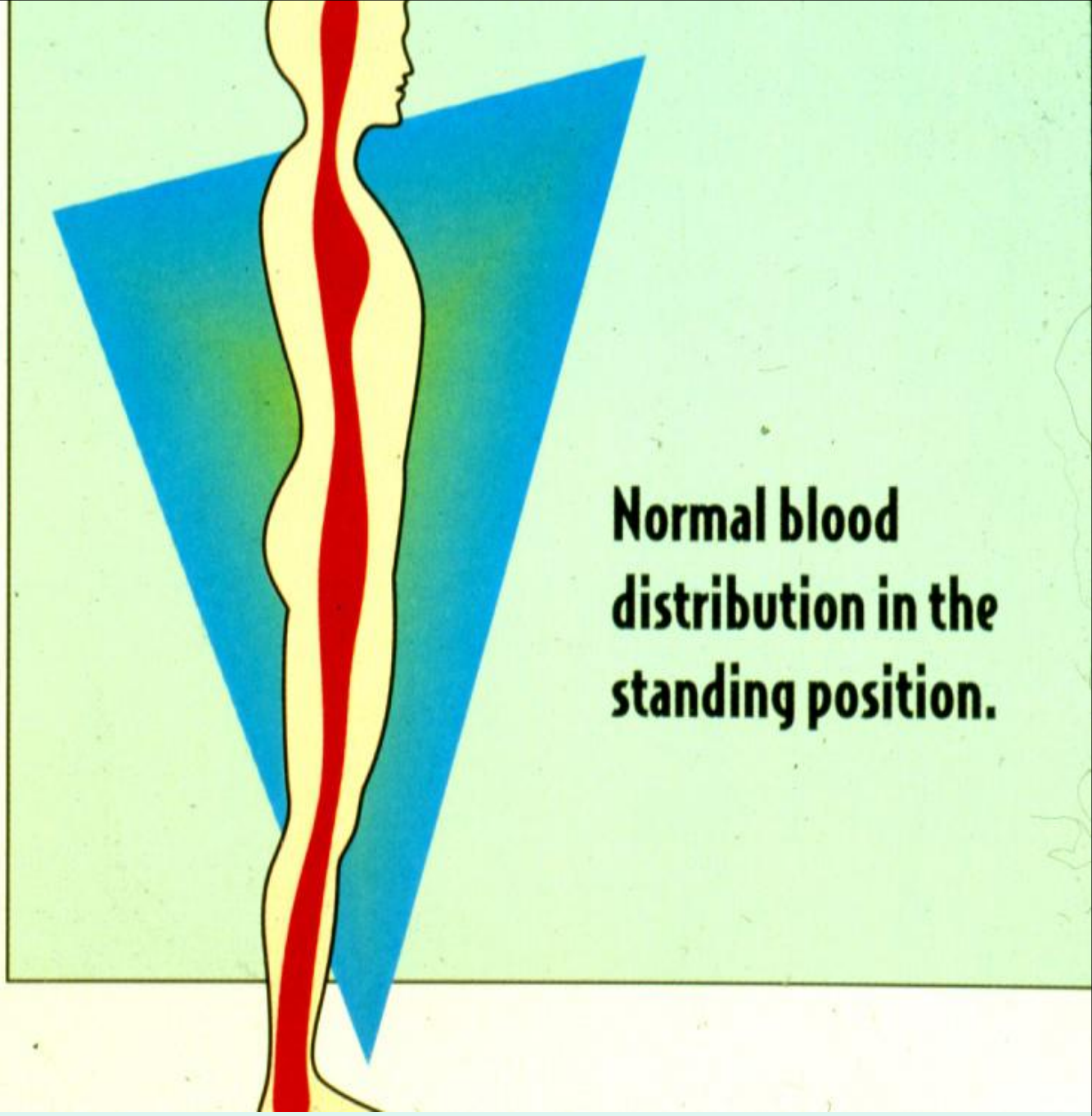
Efficient, simple and safe means to apply external counter pressure to the lower body.

RESUSCITATION OF CENTRAL CIRCULATION

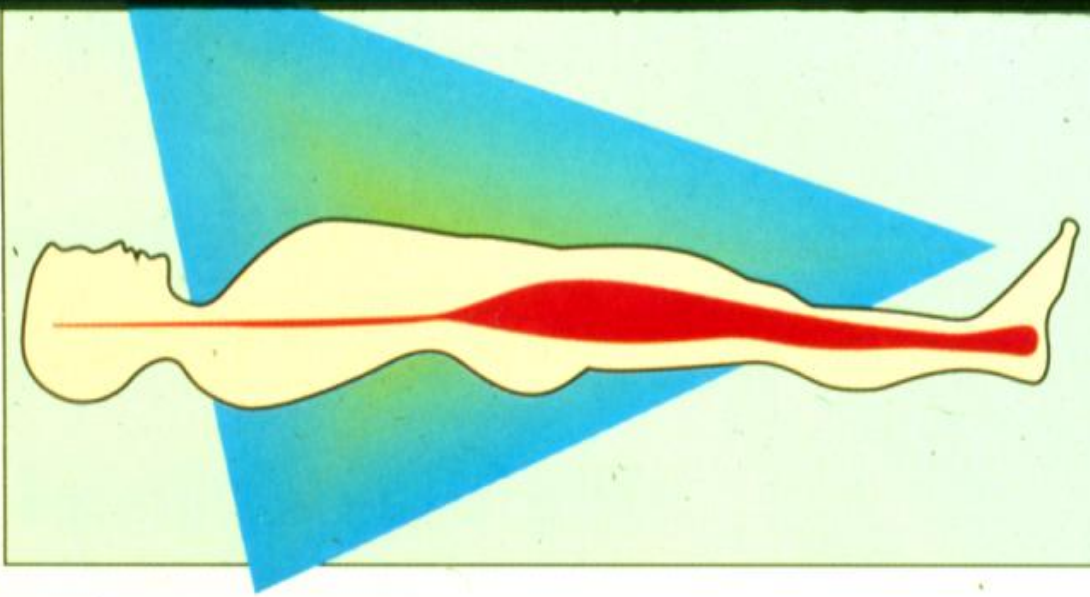
Results in translocation of 1.5-2.0 liters of blood from the lower body to the head and chest.

REDUCES HEMORRHAGE IN LOWER BODY

SHOCK & DMAST

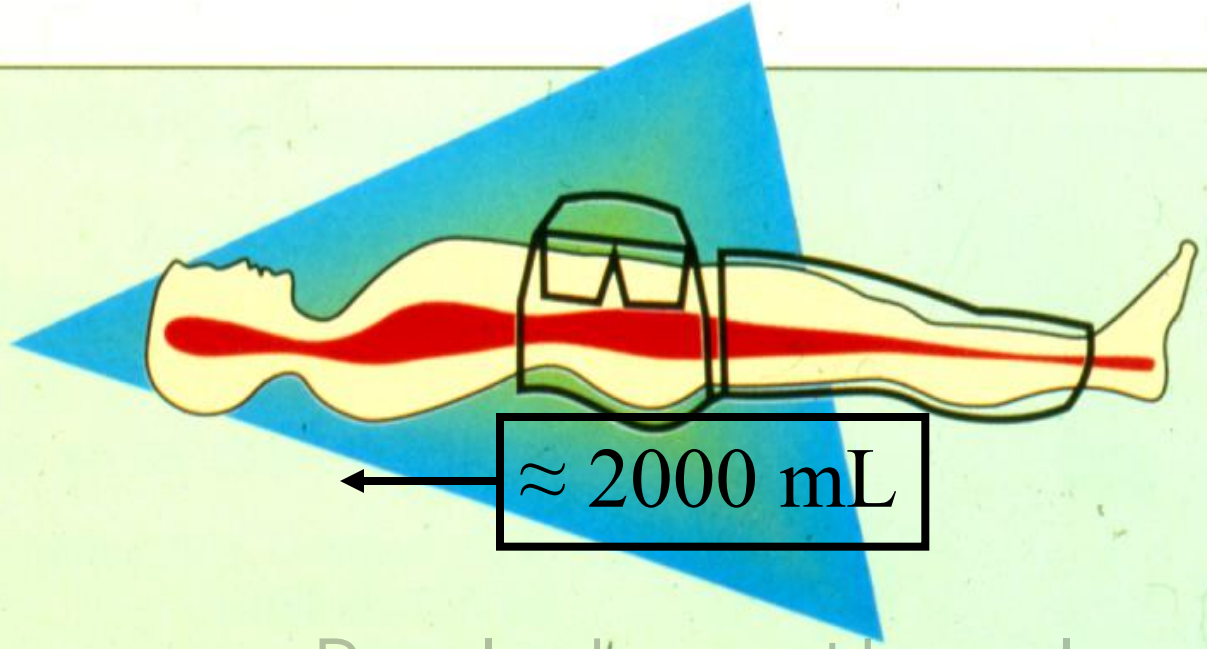


Normal blood distribution in the standing position.



In shock, the brain, heart & lungs are deprived of oxygen because blood accumulates in the lower abdomen & legs.

DMAST reverses shock by returning blood to the vital organs – heart, brain & lungs.



INDICATIONS FOR NASG

- **Initial control of hemorrhage**
- **SHOCK**
  - Postpartum hemorrhage - any cause
  - Ectopic Pregnancy
  - Post cesarean hemorrhage
  - Trauma with injury/hemorrhage below the diaphragm

THERAPEUTIC EFFECTS

1- **RESURCITATION OF CENTRAL CIRCULATION**

- Results in translocation of up to 30% of the total blood volume from the lower body to the head and chest.

2- **REDUCES HAEMORRHAGE IN LOWER BODY**

- Decrease in arterial perfusion pressure to the uterus, comparable to that achieved by ligation of the internal iliac arteries.
- Overcomes the pressure in the capillary and venous system (15-25 mm Hg.), reduction of transmural pressure, vessel radius and flow.

STRATEGY FOR USE OF NON-PNEUMATIC ANTI-SHOCK GARMENT

- Stabilizes patient while evaluating, transporting or preparing for definitive surgical treatment.
- With proper monitoring for adverse effects, can be safely and comfortably used for 24 - 48 hours.
- On occasion may arrest bleeding and avoid surgical intervention.
- May decrease need for blood transfusions.

STRATEGY FOR USE OF NON-PNEUMATIC ANTI-SHOCK GARMENT

HOWEVER, use of anti shock garment does not avert the necessity for evaluation to identify cause of shock, management of fluid and blood replacement, and appropriate therapy for coagulopathy.

WHO CAN APPLY NASG?

ANYBODY.....

They includes;

- Doctors
- Nurses
- CHEW
- Health Attendants
- Ambulance drivers
- Etc

When to remove the ASG??

- Intravascular volume re-expanded with blood and saline
- Vital signs stable and Systolic >100
  Pulse <100
- Hb>7.0 or Hct (PCV) >20
- Remove one segment every 15 minutes starting below with #1 - check pulse/BP

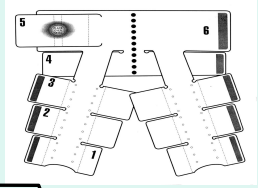
CONTRAINDICATIONS – NASG use

- Viable fetus in-utero
- Pulmonary edema
- Bleeding above the diaphragm
- Congestive heart failure due to mitral stenosis
- A major cause of morbidity and mortality when using the NASG is the premature and inappropriate release of external counter pressure.

Recognition of Postpartum Hemorrhage

...with excessive bleeding or signs of shock, apply ASG now!

ASG



IV access, saline

baseline labs

infuse blood, components

diagnose etiology

uterine atony

retained POC

lacerations of cervix,vagina or perineum
uterine rupture or inverson

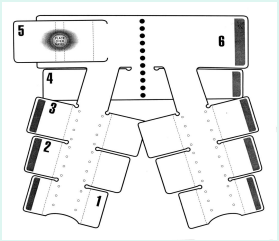
examine uterus
medical uterotonics
& uterine massage

examine uterus
curettage

suture lacerations,
restore anatomy,
laporotomy for repair
of uterine rupture

with continued bleeding or signs of shock, apply ASG now! and consider uterine pressure pack

ASG



Vessel embolization

Exploratory Laporotomy

uterine artery ligation

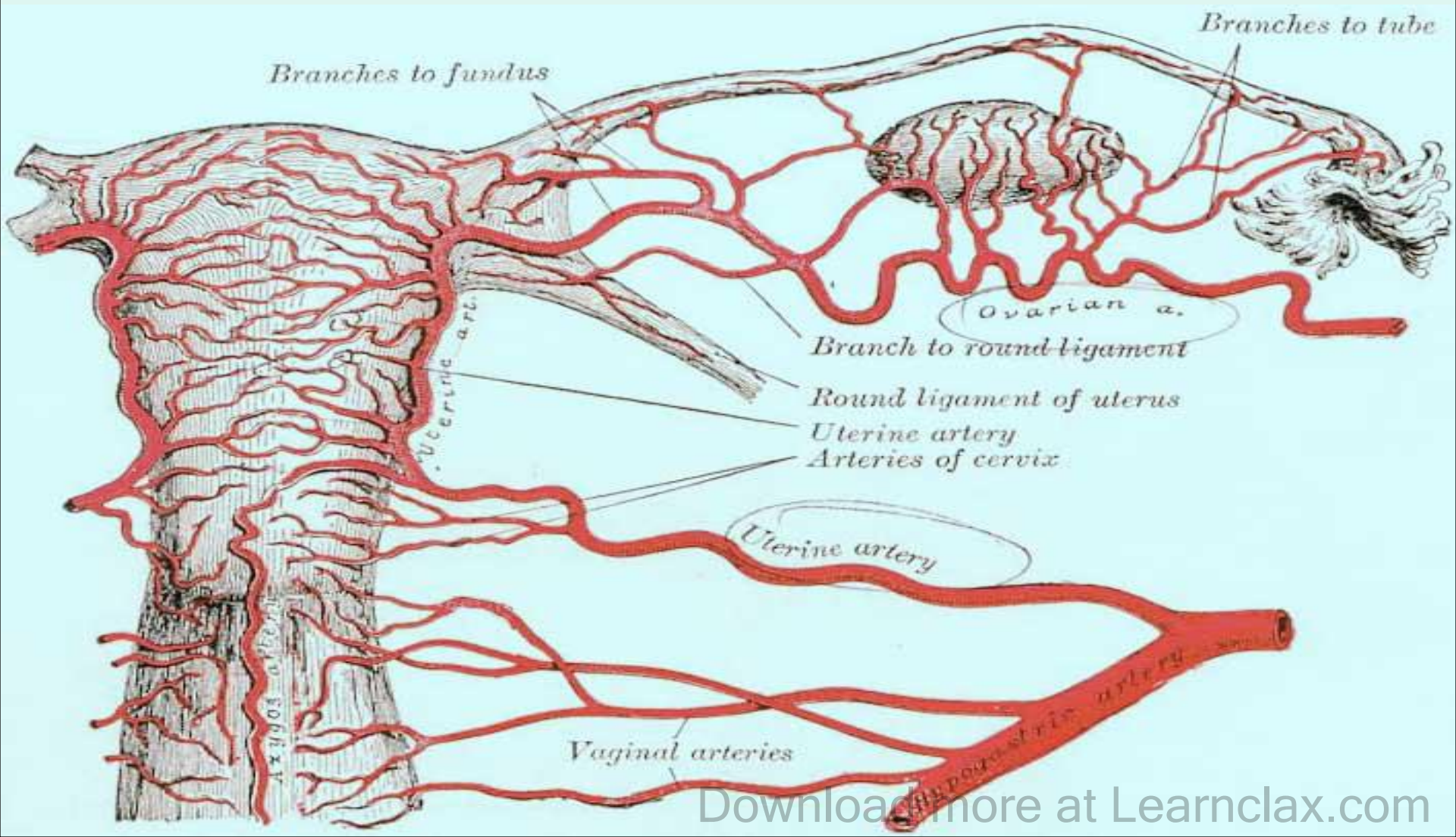
hypogastric a. ligation

B-Lynch suture

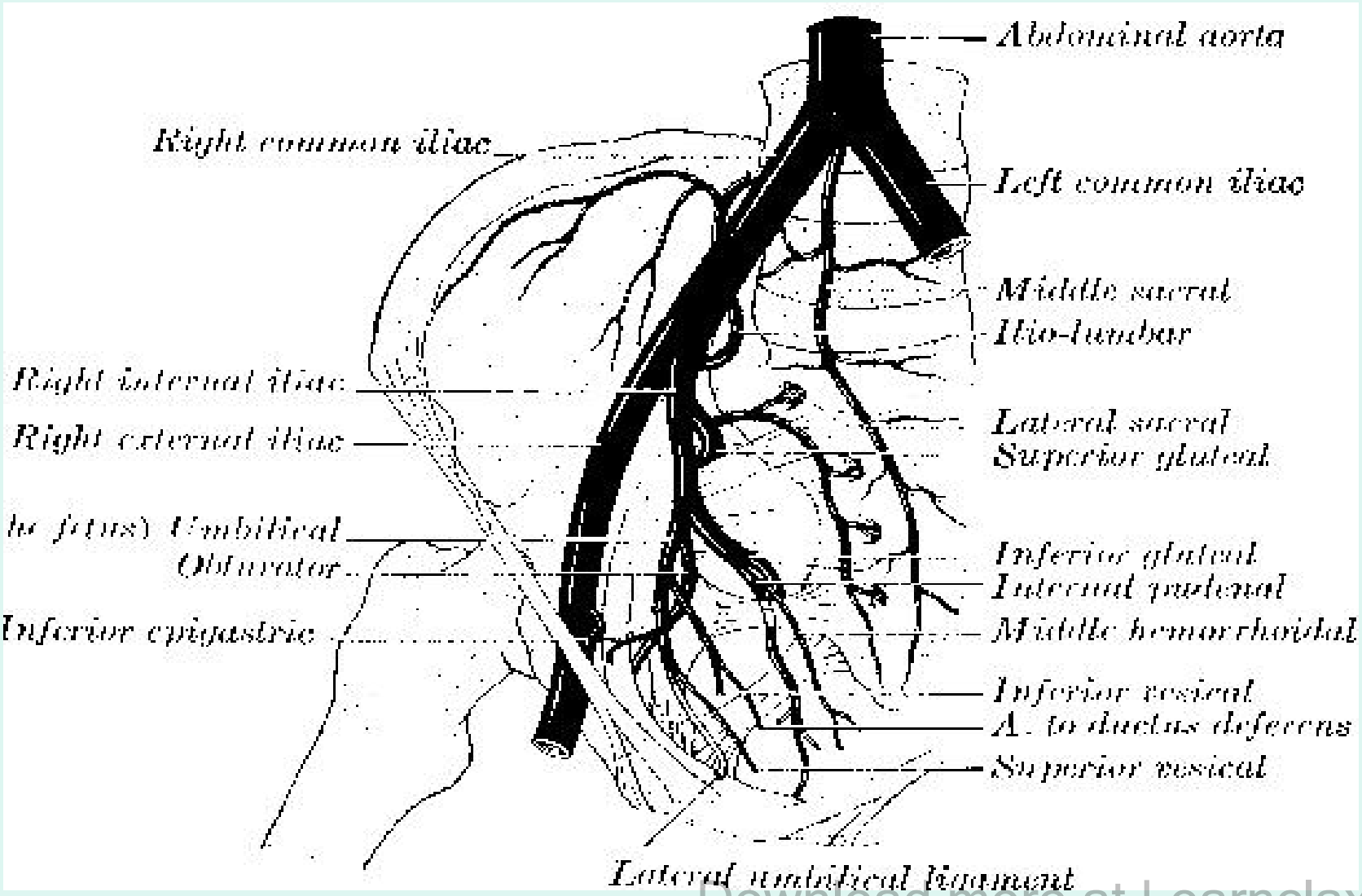
hysterectomy

Post C/S hemorrhage

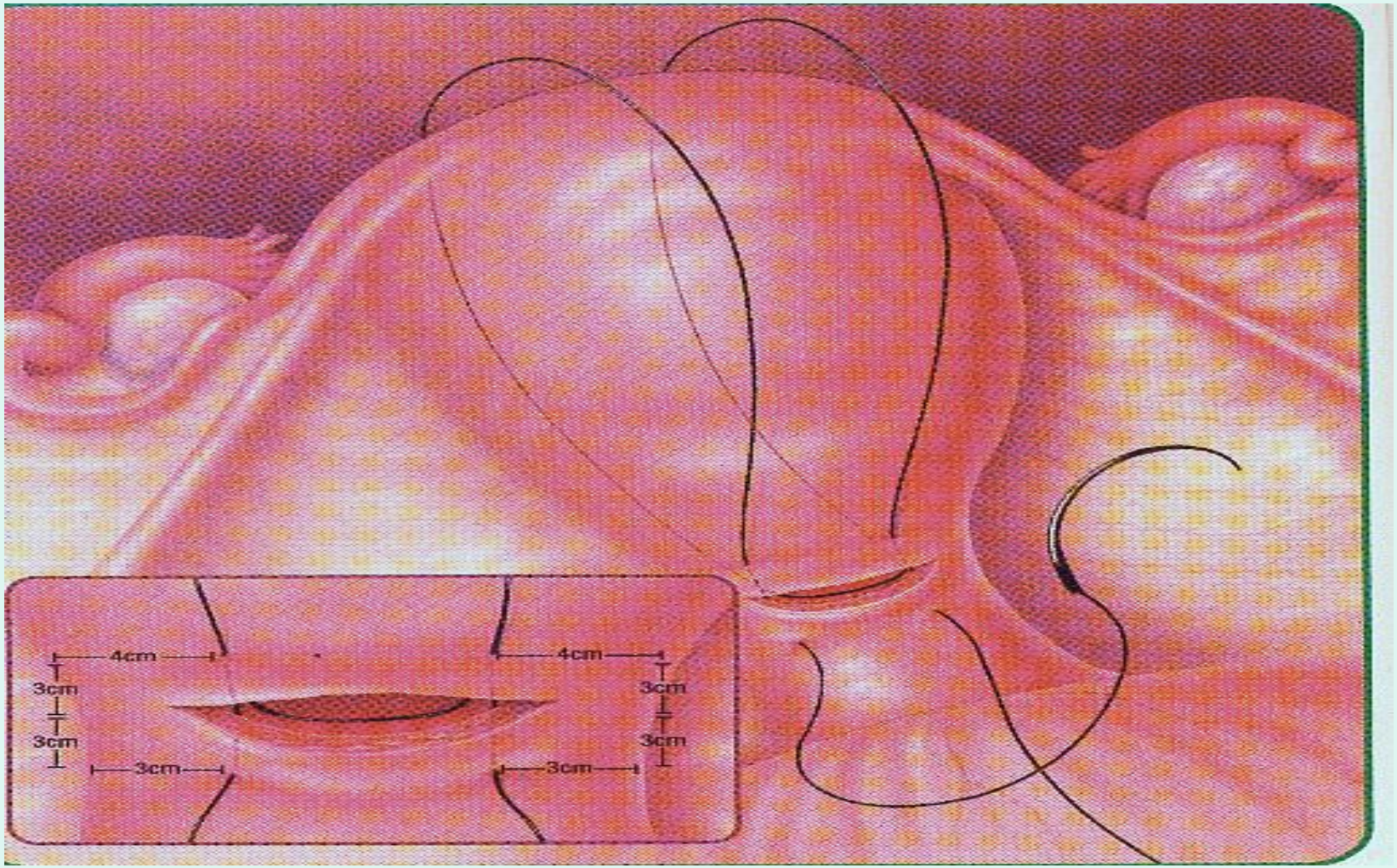
UTERINE & OVARIAN VESSELS LIGATION



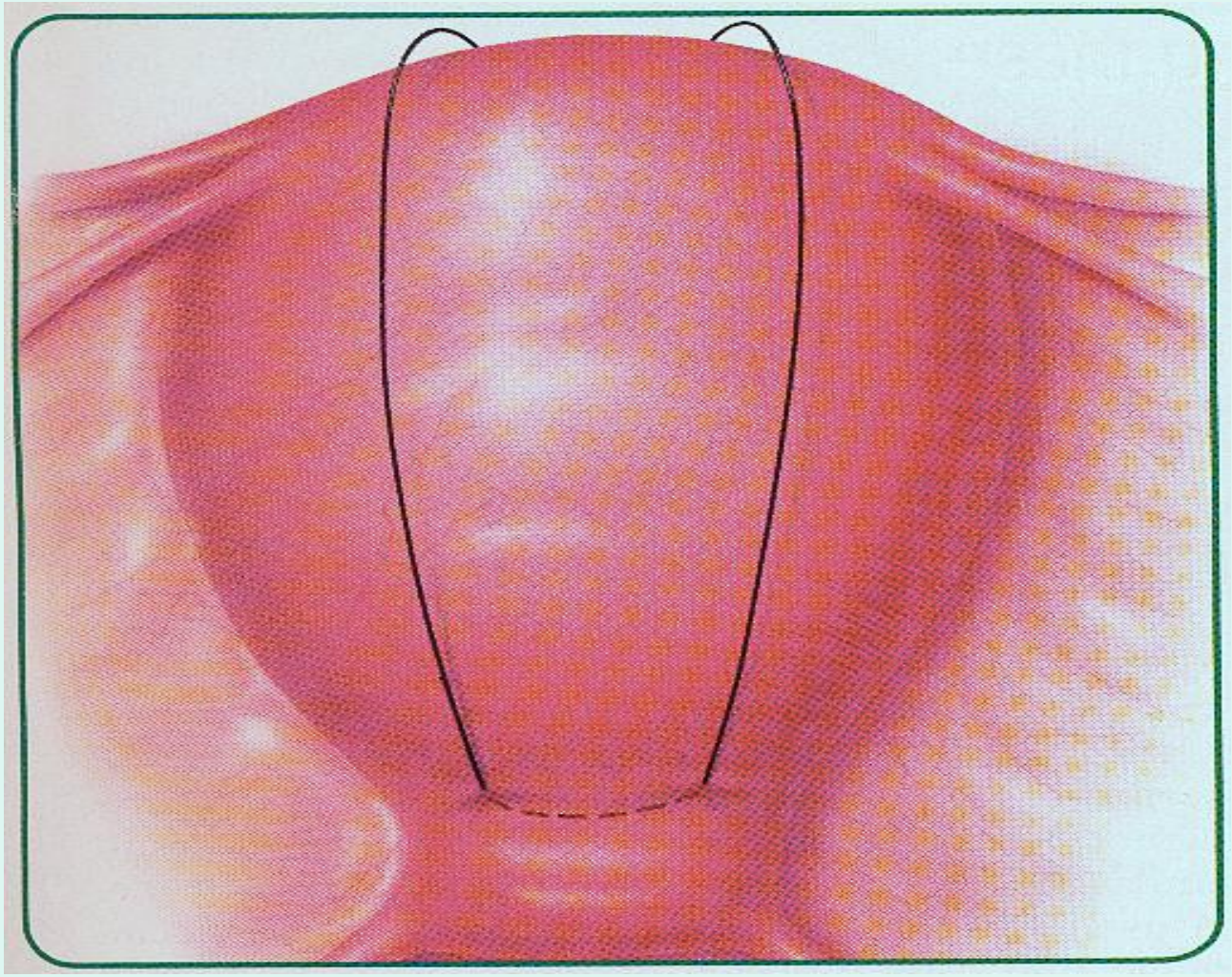
HYPOGASTRIC (INTERNAL ILLIAC) ARTERY



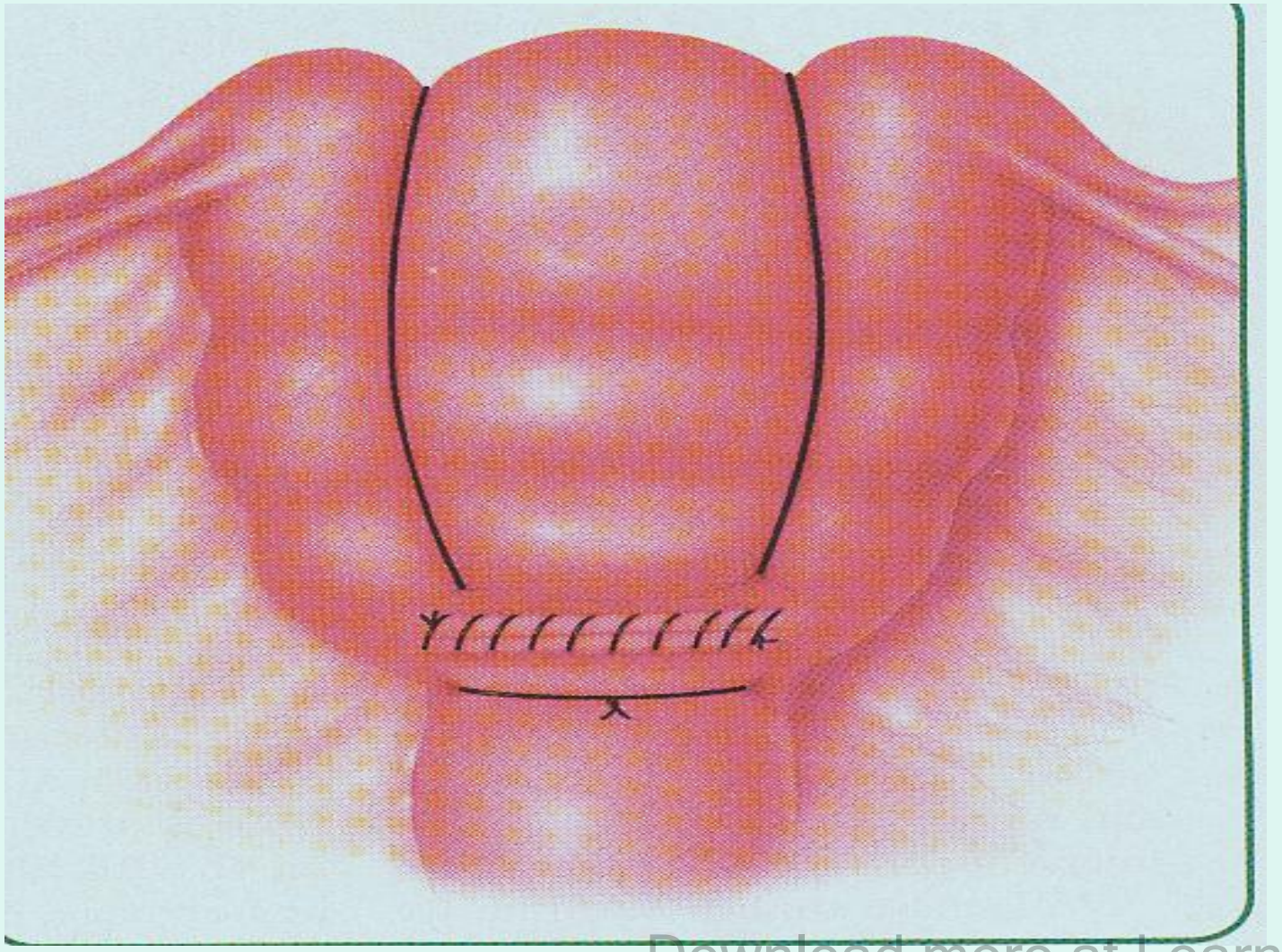
B –Lynch stiches



B-Lynch (posterior view)



B-Lynch (After-anterior view)



Implementation Framework

- *Key Elements*
  - Constituency stakeholder advocacy
  - Facility assessment /selection
  - Staff Training
  - Implementation
  - Monitoring

Implementation

- All trained staff may place garment when needed.
- In any location, the aim is to train tertiary, secondary and primary centers so they can collaborate.
- Primary and secondary facilities can refer to tertiary center for definitive treatment and removal of NASG.

Supplies

Minimum for Placement	Minimum for Post-Application Management	Best Case Scenario
✓ NASG	✓IV fluids (Normal saline) and equipment ✓Cannula ✓Fluid/blood given set ✓ Blood pressure cuff ✓ Stethoscope	✓ Blood transfusion supplies ✓ Foley catheter ✓ Oxygen

Labs

Minimum for Placement	Minimum for Post-Application Management	Best Case Scenario
✓ None	✓ Blood type cross and match	✓ PCV, Hematocrit ✓ Hb ✓ Platelets ✓ E/U ✓ Creatinine ✓ Urine Analysis ✓ Coagulation test if indicated

Medications

Minimum for Placement	Minimum for Post-Application Management	Best Case Scenario
✓ None	✓ **Oxytocin or Ergometrine**	✓ **Oxytocics** • **Misoprostol** • **Methergine** • **Ergometrine** • **Hemabate** ✓ **Antibiotics** ✓ **Dopamine**

Setting

Minimum for Placement	Minimum for Post-Application Management	Best Case Scenario
✓ None	✓ Clinic or hospital with blood bank and lab available	✓ Hospital with operating theatre ✓ Emergency fund for maternity services to ensure full treatment protocol ✓ Blood transfusion services

Challenges

- Training of trainers, definition of curriculum

  Joint training for all cadre ?

  Content for each cadre if separate training

  Checklist for proficiency

- Develop and formalize a referral protocol for patients in the NASG

  With or without garment?

  Garment reinbursement- same or another NASG

  Whose responsibility- refering or receiving facility or patients

- Availability of facilities for other measures of managing obstetric haemorrhage

  Fluids, blood, OR, lab

- Community acceptance

  New device, not known by ALL providers, not understood by community

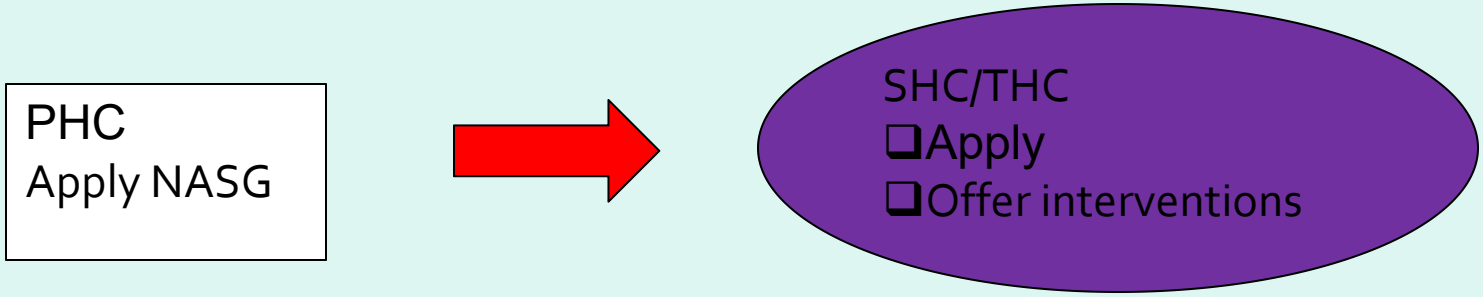
Challenges

- Ensuring proper cleaning and care of NASGs
  - timely laundary- by who ?
  - proper folding and storage/ safe keeping
  - regular audit- nos, clealiness, integrity
- Ensuring adherence to protocol
  - indication/criteria to avoid laxity and undue usage
  - for now case counseling and consent
  - monitoring and provision for consumables

Challenges

- Training of trainers, definition of curriculum
  - Necessary prerequisite for quality of care

- Develop and formalize a referral protocol for patients in the NASG



- *Availability of facilities for other measures of managing obstetric haemorrhage*

Challenges

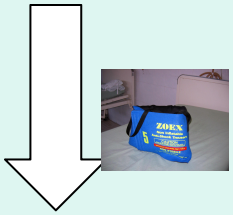
- Community acceptance
  - Advocacy – community gate-keepers, opinion/political/traditional leaders etc
  - Mass mobilization – use of media, posters (local language)
  - Introduction of the garment during ANC
  - Other forums – religious gathering (churches, mosque, temple (?)) etc

Challenges

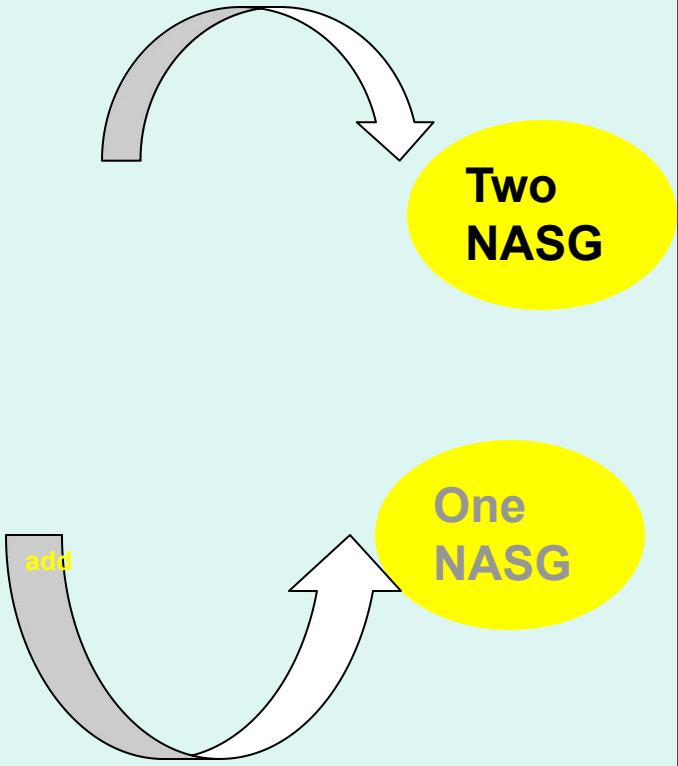
- Ensuring proper cleaning and care of NASGs
  - Training on proper cleaning with genuine supervision
- Ensuring adherence to protocol
  - Need to have the protocol written out
  - Regular drills
  - Orientation of need staffs
- Documentation
  - Vital signs
  - Medical records
    - Profile of the patient – age, parity, gravidity, mode of delivery, cause of haemorrhage and so on
    - Time of application
    - Time of removal
    - Review during removal

Challenges

- Determining number of NASGs needed
  - **First 1000 delivery per annum**



  - **Subsequent 1000 deliveries**



Challenges

- Prioritizing between patients
  - **First patient that deserves should be offered**
  - **Conscious of the ethical consideration**
- Guaranteeing minimum institutional requirements
  - **Advocacy with policy maker & HCF management – fluids, resuscitation kit, blood and so on**
  - **Capacity building for staff through training & re-training**

Challenges

- Define referral model for NASG
  - **Transfer after removing NASG – NEVER!!!!**
  - **Transfer with NASG and swap**
  - **Transfer with NASG and wait till patient is weaned off**
- Long-term sustainability
  - **Community involvement**
  - **Capacity building of staffs and others**
    - **Use, cleaning and storage**
  - **Payment for use (?)**

CONCLUDING REMARKS

- Continuum of care project
  - Community mobilization
  - Use of NASG
  - Misoprostol