Post-partum haemorrhage

The World Health Organization defines postpartum hemorrhage as blood loss of 500 mL or more in the first 24 hours postpartum . Although we have no studies to authenticate it, the fact remains that post-partum haemorrhage (PPH) is more common in institutions dealing with a large number of deliveries as also in government run hospitals which cater to women from the lower socio-economic strata. Gynaecologists who have retired from government institutions and joined the private sector will vouch for the fact that they used to see more patients with PPH when they were working in the government sector. Something more than the social status of the patient seems to be operative in the higher incidence in some hospitals compared to others. Better patient care with sound following of scientific principles can prevent many catastrophes in the management of PPH. What follows in this article is a review of some tips in the medical management along with descriptions of a few non-traditional surgical techniques in the management of this condition that has been described in literature.

Prevention:

PPH should be anticipated in patients with large uterus due to various factors, uterine atony due to abnormalities in labour like prolonged or precipitate labour,maternal parity more than four, prolonged use of oxytocin for labor induction or augmentation, chorioamnionitis, use of magnesium sulfate as treatment for preterm labor or pre-eclamsia and in patients with clotting disorders.

Active management of third stage of labour is known to reduce blood-loss post-partum and should be diligently practiced in such patients.

The blood loss at this time can be significant, with approximately 700 mL/min flowing to the term uterus. The average blood loss at a vaginal delivery, which is typically 500 mL causes little or no change in the blood pressure or pulse in most normal pregnant women. Pregnancy-induced hypervolemia accounts for the 30% to 70% increase in blood volume—or an additional 1 to 2 L that prevents symptoms with the typical 500-mL blood loss. A loss of more than 500 mL for a vaginal, 1000 mL for a cesarean and 1500 mL for a repeat cesarean delivery has been defined by many investigators as a postpartum hemorrhage.

Examination of placenta:

The placenta should be examined thoroughly in the third stage to look for missing cotyledons.

This is specially important, in patients with placenta accrete, percreata, etc.

A FEW WORDS ON THIS CONDI-TION: Placenta accreta occurs at a variable rate and is noted to occur in 1 in 1600 to 70,000 pregnancies. It has an affinity to arise in multiparous women and women with advanced maternal age. The two most important risk factors for a placenta accreta are a known placenta previa and a prior cesarean delivery. Other risk factors include uterine curettage, uterine infection leading to scarring, previous manual placental removal, nonfundic implantation sites (eg, cornual or cervical), leiomyomatous uteri, and a uterus with a rudimentary horn. Since

all the predisposing factors for this condition, like LSCS, leiomyomata, uterine curettage, etc seem to be on the rise, the incidence of this condition may be on the rise. Patients may quite often forget to give history of uterine curettage . Uterine infection may also go unnoticed in history taking. Thus proper evaluation of the patient at the time of first visit and documentation is also very important in predicting this condition.

Active Management of third stage of labour:

Active and physiologic management are two different and well-studied strategies used in the management of the third stage of labor. The basic mechanisms of the active management include uterotonics with delivery of the anterior shoulder of the infant, gentle downward cord traction with counter traction of the uterine body, and early cord clamping. Physiologic management does not recommend uterotonics until after delivery of the placenta (if at all) and no cord traction, and the timing of cord clamping varies, usually after pulsation of the cord has ceased.

{Although not actually relevant to pph, as an aside, a point about cord clamping is worth mentioning.   In many labour rooms undue hurry is shown by the nursing staff in trying to clamp the cord, as they feel the baby is "safe" once the connection has been severed. In case the baby has not cried, or seems acidotic, they feel that expediting the cord cutting will help in baby resuscitation. It should be remembered that as long as the cord pulsation is present, the baby is still receiving oxygen from the mother and more attention should be paid to sucking the baby's mouth and nose. Clamping of the cord could be delayed till the pulsation of the cord has ceased. }

In a metaanalysis, it was found that for every 12 patients who received active rather than physiologic management, one postpartum hemorrhage was prevented. For every 67 patients who were actively managed, 1 woman would avoid a transfusion with blood products.

The three key elements in active management of labour are:
1. Provision of a uterotonic drug within 2 minutes of birth,
2. Controlled cord traction and
3. Uterine massage after delivery of the placenta.

Administration of uterotonics: Oxytocic prophylaxis significantly reduces the risk of postpartum hemorrhage by 40% to 50%.

Oxytocin:

1. 10 Units of Oxytocin administered IM is the preferred medication and route for the prevention of PPH in low-risk vaginal deliveries.
2. Oxytocin 5IU diluted to 5 ml and given intravenously over 1 to 2 minutes can also be used. . However, this should be avoided in women with major cardiovascular disorders.
3. Intravenous infusion of oxytocin 5IU diluted to 5ml and given intravenously over 1 to 2 minutes can also be used.

Methyl ergometrin:

If oxytocin is not available, Methylergometrine 0.2 mg intramuscular can be used

Misoprostol:

Misoprostol, 800 to 1000 ìg administered rectally or 400 to 600 ìg administered orally, is proven to prevent and reduce postpartum blood loss.

Profile of drugs used for PPH

Drug	Dosage/route of administration	Action	Side effects	Caution
Oxytocin	10 U IM 5 U IV diluted to 5 ml over 1- 2 mins slow 20 U in 500ml NS/RL infusion @ 150 ML/hour	Onset 2-3 mins Lasts upto:15-20 min	None or minimal	Direct IV oxytocin contra indicated in cases of cardio vascular failure and heart diseases.
Methylergometrin	0.2 mg IM	Onset:2-7mins Lasts 2-4 hours	May increase risk of retained placenta .nausea vomiting, headache ,hypertension	Avoid in hypertension, heart disease, Rh negative mothers
Misoprostol	600 mcg oral/SL/PR	Onset 3-5 mins. Peak 20-30 mins Lasts upto:75 mins	Shivering ,slight rise in temperature	No contraindications
Carboprost	250 mcg IM	Onset: 1-2 mins Lasts 15-20 mins	Vomiting, diarrhea ,bronchospasm	Avoid bronchial asthma

Removal of placenta at lower segment caesarian section (LSCS):

Manual removal of the placenta at caesarean section may do more harm than good, by increasing maternal blood loss and increasing the risk of infection. Spontaneous placental removal appears to lessen blood loss by allowing time for the uterine musculature to contract around the spiral arteries, effectively stopping uterine hemorrhage. If the operator is awaiting spontaneous placental detachment and observes excessive bleeding from the uterine incision, this bleeding site can be clamped until spontaneous placental detachment occurs.

It should be remembered that when blood loss at caesarean section is excessive this must be acknowledged and the patient must be carefully monitored afterwards, with regard to pulse and

blood pressure. Collapse can occur without revealed bleeding. It should also be remembered that a young woman may maintain a normal blood pressure until sudden and catastrophic decompensation occurs.

Patients with placenta praevia specially with previous LSCS are at high risk for PPH and these patients should be handled with care, with adequate back up.

Management of a patient who presents with PPH:

The routine drill of looking for a cause, whether traumatic or atonic PPH and immediate measures to prevent the patient from going into shock and treating the cause is familiar to all practicing gynaecologists. Some salient points in the management of the patient's circulatory status are worth mentioning. Due to the 40% expansion in blood volume that occurs by the 30th week of gestation and the 30% rise in hematocrit that is observed in pregnancy, pregnant patients seem to tolerate the acute blood loss of delivery quite well. A pregnant woman can loose up to 20% of her blood volume before showing overt clinical signs. The fact that significant fluid shifts from the interstitial space take place within the first 3-4 hours after delivery, will partially correct any volume deficit and further mask signs of excessive blood loss.

Medical management of atonic PPH:

Atonic PPH is the most common cause of PPH. Uterotics remain the mainstay of treatment. If it fails, other measures like packing the uterus or surgical ligations may be resorted to. The uterotonic administered should last at least 2-3 hours. (American College of Obstetricians and Gynecologists, 1998). This could be 10 U of oxytocin in 500 mL of intravenous fluid by continuous drip, 200-250 mcg of ergonovine intramuscularly, or 250 mcg of 15-methyl prostaglandin F2-alpha (carboprost) intramuscularly. With the advent of newer agents in the management of atonic PPH, the need to use surgical methods for managing PPH is decreasing day by day.

Mnagement of shock:

The amount of blood lost can be gauged from clinical symptoms and signs as given in the table given on next page.

As soon as a patient is seen in obstetric shock, one should call for help. The next step is always to put up at least one large bore intravenous line with resuscitation fluid (such as Ringers Lactate) and add 20 units of oxytocin to the first litre of fluid. The patient's bladder should now be emptied, again to allow an atonic uterus to contract and minimize the bleeding. It is good to remember that the volume of any clotted blood represents half of the blood volume required to form the clots. NS is a reasonable solution in the labor ward setting because of its low cost and compatibility with most drugs and blood transfusions. The risk of hyperchloremic acidosis is very low in the setting of PPH. If large amounts (>10 L) of crystalloid are being infused, a change to Ringer lactate solution can be considered. Dextrose-containing solutions, such as 5% dextrose in water or diluted NS in 5% dextrose in water, have no role in the management of PPH. The loss of 1 L of blood requires replacement with 4-5 L of crystalloid because most of the infused fluid is not retained in the intravascular space but instead shifts to the interstitial space. This shift, along with oxytocin

use, may result in peripheral edema in the days following PPH. Use wide-open initial infusion rates, with the goal of infusing the required replacement volume over minutes rather than hours. PPH of up to 1500 mL in a healthy pregnant woman can usually be managed by crystalloid infusion alone Large volumes of colloid solutions (>1000-1500 mL/d) can have an adverse effect on hemostasis. No colloid solution has been demonstrated to be superior to NS, and, because of the expense and the risk of adverse effects with colloids, crystalloid is recommended. A meta-analysis in the Cochrane Library comparing resuscitation with colloid solutions versus crystalloid favored the use of crystalloids with respect to mortality (Choi, 1999; Alderson, 2000). Thus crystalloids should be preferred over colloids in the resuscitation of the PPH patient.

 Order blood transfusions if blood loss is ongoing and thought to be in excess of 2000 mL or if the patient's clinical status reflects developing shock despite aggressive resuscitation. Patients requiring massive transfusions (>10 units of blood products) should certainly be managed in a level 3 institution, since careful monitoring and the use of more specialised blood products will be needed. As soon as it becomes apparent that a patient will need a massive transfusion, baseline coagulation studies and a complete blood count with platelet count should be ordered. It is advisable that such a patient should first receive 4 units of packed red blood cells, to improve the oxygen carrying capacity, after which whole blood should be administered to replace volume loss and provide the coagulation factors and proteins needed to maintain hemostasis and colloid osmotic pressure. Platelets should be replaced when depleted, because massive transfusion may impair platelet function.

Coagulopathy: Dilutional coagulopathy is not usually observed until approximately 80% of the original blood volume has been replaced. . Regularly monitor hemostatic test results in all women who require a massive transfusion. If findings are abnormal in conjunction with ongoing bleeding or oozing from puncture sites, mucous surfaces, or wounds, additional blood products are required. Infuse fresh frozen plasma (FFP), beginning with 4 U and following with additional units to normalize the coagulation test findings. Cryoprecipitate may be useful along with FFP because of the markedly depressed fibrinogen levels. Cryoprecipitate provides a more concentrated form of fibrinogen and other clotting factors (VIII, XIII, von Willebrand factor) and is faster to prepare in the blood bank. It is commonly given in 6- to 12-U doses and may also be helpful immediately before any surgical intervention in patients with abnormal coagulation test results. The use of heparin and antifibrinolytic therapy is not recommended in women with DIC of obstetric origin.

Summary of management in defective coagulation: Order coagulation screen (International Normalized Ratio, activated partial thromboplastin time) if fibrinogen, thrombin time, blood film, and D-dimer results are abnormal.
1. Give FFP if coagulation test results are abnormal and sites are oozing.
2. Give cryoprecipitate if abnormal coagulation test results are not corrected with FFP and bleeding continues.
3. Give platelet concentrates if the platelet count is less than 50 X 109/L and bleeding continues.
4. Use cryoprecipitate and platelet concentrates before surgical intervention.

Other measures in the management of atonic PPH:

Uterine massage is universally recommended to prevent and treat uterine atony. When carrying out bimanual uterine compression the hand in the vagina should elevate the uterus to keep the uterine arteries on 'stretch'.

Some other measures useful in the management of atonic PPH are:

1. Underline External aortic compression : This has been found to be useful by Riley DP; Burgess RW et al. The abdominal aorta was compressed by firm pressure with a closed fist just above the umbilicus. It is recommended that external aortic compression be considered in severe life-threatening postpartum haemorrhage, particularly during stabilisation or transport of the patient. This simple manoeuvre may be used as an adjunct to other measures and could prove of benefit, especially in locations or situations where advanced medical assistance is geographically or temporally removed.

2. Umbilical vein injection of saline solution plus oxytocin : This appears to be effective in the management of retained placenta. Taking the opinion of two doctors from District hospital, Thrissur, with 250-300 deliveries per month, Dr.Ramesh P did not find this technique useful, but Dr.Lekha found it useful in prevention of manual removal of placenta.

3. Tight packing of uterus with a long gauze strip : It can occlude open sinuses in atonic PPH.

4. Packing the uterus with a condome filled with saline: This procedure is being done in JJ hospital, Mumbai, since 1981 by Dr.Shivkar. It has also been published by a Bangladeshi author. The procedure as described by Sayyeba Akhtar:

a. Under aseptic precautions a sterile rubber catheter was inserted within the condom and tied near the mouth of the condom by a silk thread.

b. Urinary bladder was kept empty by an indwelling Foley's catheter.

c. After putting the patient in the lithotomy position, the condom was inserted within the uterine cavity.

d. Inner end of the catheter remained within the condom.

e. Outer end of the catheter was connected with a saline set and the condom was inflated with 25-500 mL of running normal saline.

f. Bleeding was observed, and when it was reduced considerably, further inflation was stopped and the outer end of the catheter was folded and tied with thread.

g. Uterine contraction was maintained by oxytocin drip for at least 6 hours after the procedure.

h. The uterine condom was kept tight in position by ribbon gauze pack or another inflated condom placed in the vagina.

i. The condom catheter was kept for 24-48 hours and then was deflated gradually over (10-15 minutes) and removed.

j. Patient was kept under triple antibiotic coverage (amoxicillin [500 mg every 6 hrs] + metronidazole [500 mg every 8 hrs] + gentamicin [80 mg every 8 hrs]) administered intravenously for 7 days.

I have tried this method successfully in a patient who was serologically HBsAg positive, with massive hepatosplenomegaly and severe jaundice, when she went into PPH after a normal delivery in 1991. Instead of putting a gauze in the uterus, I had held on to the two lips of the cervix along with the catheter, with gloved fingers. Sponge holders on the cervical lips may also be used to prevent the inflated condome from slipping out of the uterus. . In the past, when

medical treatment , and simple measures like bimanual compression of uterus failed to control PPH, one had to perform hysterectomy. If the surgeon is experienced, an internal iliac artery ligation could be resorted to. However, by now many articles have come out with many other procedures which could be tried besides the traditional ones. Some of them are listed below;

Uterine artery ligation: This could be done vaginally in case of normal delivery or at the time of caesarian section.

Vaginal uterine artery ligation: This procedure, which is quickly learned, is performable in the delivery room with minimal preparation, with or without bladder retraction. Once consent has been obtained, the procedure is performed without delay after the failure of conventional management (fundal massage, intravenous syntocinon, intramuscular methylergometrine maleate, rectal misoprostol, intramyometrial prostaglandin, etc). Transfer to an operating room is unnecessary and takes time. Intravenous syntocinon is continued during the procedure and regional anesthesia maintained. Local anesthesia, such as pudendal or cervical block, can be administered as required.

The patient is placed in the lithotomy position, swabbed, draped, and catheterized. The procedure itself can be performed with or without bladder retraction. The anterior and posterior cervical lips are clamped with sponge holding forceps. A 2-cm horizontal incision is made in the anterior cervix about 1 cm beneath the estimated vaginocervical fold, and the bladder is reflected in the natural plane using a swab on a stick. Gentle but firm traction is then used to pull the uterus downwards and sideways, towards the contralateral side of the intended ligature, to maximize cephalad and lateral access. From cephalad and behind the bladder, a curved needle is led towards the myometrium under the guidance of the index finger placed in the cervical canal and lower uterine segment. The uterine artery—whose pulsation is readily palpable and sometimes visible from laterally—is then encircled with the vein and a layer of uterine tissue and ligated. Fingertip injury is avoided by retracting the finger after palpation and immediately before applying the stitch. It is very important to pull the uterus gently towards the contralateral side to allow for ample working space and visualization of the vessel bundle. The synthetic absorbable thread (Vicryl) is clamped using Kocher forceps and the vessel bundle pulled caudally. An additional one or two ligatures—or more, depending on the anatomical variations of the uterine artery—are applied cephalad to secure the ligation, using the same technique. The descending branches are readily demonstrable, and the immediate hemostatic effect after the first one or two ligatures is substantial, equivalent to that of internal iliac (hypogastric) artery ligation: a pulsating arterial system is changed to one resembling venous flow. As arterial pulsation diminishes, blood clots may form distal to the ligation and remain in situ rather than be dislodged by the pulse pressure. The whole procedure is then repeated with the contralateral vessel bundle. The anterior vaginal wall and anterior cervical lip are reunited with a few interrupted stitches.

Closer home, Dr.Suman Batra from Kasargode has tried this method successfully in one patient. Alternatively, if there is massive bleeding and/or limited access to the vessels, mass uterine artery ligation may be performed without preparing the vessel bundles under direct vision. The guiding index finger inside the upper cervical canal/lower uterine segment is then

used instead. The technique could fail if it is not done in time (allowing coagulopathy to develop); coagulopathy caused by other etiology (infection, preeclampsia, etc); and hemorrhage from the vagina rather than the uterus.

Uterine artery ligation at caesarian section: Direct ligation of the uterine vessels has been described for controlling bleeding at caesarean section. Bilateral mass ligation of the uterine arteries and veins involves placing a suture to include 2 to 3 cm of myometrium, at a level about 2 to 3 cm below the uterine incision. The objective of ligation of the uterine arteries is to decrease uterine blood flow, since approximately 90% of the uterine blood supply in pregnancy comes from these vessels. After passing over the ureter, the uterine artery divides at the level of the internal cervical os (isthmus) into a main ascending and a smaller cervicovaginal branch.

The first step in ligation of the uterine arteries is to reflect the bladder peritoneum inferiorly, as one would do before starting a Caesarean Section. A suture is then placed 2-3 centimetres below the level at which a Caesarean Section would usually be performed, using a polyglycolic absorbable suture on a large atraumatic needle. A good "bite" of myometrium, about 2-3 centimetres deep, should be taken to ensure that the uterine artery is not severed in the process. This ligature would obiliterate most of the branches that supply the lower segment and a branch that supplies the cervix.Extreme care should be taken not to site the suture too low, i.e. too close to the base of the bladder, thereby tying off the ureter. If the bladder is reflected well out of the operative field, this should not be a problem. Local oozing may be controlled with direct injection or compression with warm saline packs. While the uterus may remain atonic, blanching is usually noted and blood flow is greatly diminished or arrested.

 Stepwise uterine devascularisation has been described in a report from Egypt. The steps are: 1. unilateral and 2. bilateral uterine artery ligation (at the upper part of the lower uterine segment), 3. low uterine vessel ligation after mobilisation of the bladder, 4. unilateral and 5. bilateral ovarian vessel ligation. Myometrium is included in the ligatures in steps 1 to 3. Steps 1 and 2 were effective in over 80% of cases. This technique can also be followed by normal menstruation and pregnancy.(james drife) The ovarian artery usually anastomoses with the ascending uterine artery where the ovarian enters the mesovarium and can usually easily be identified just below the Fallopian tube. A suture should be placed carefully around the ovarian artery through an avascular window in the mesovarium, taking care not to involve the Fallopian tube in the suture. If it is impossible to identify the ovarian artery clearly, it is possibly safer to tie off the whole infundibulopelvic ligament. Although there has been some concern about future ovarian function after tying off these vessels, it has been found that normal menstrual cycles and subsequent pregnancies are possible.

Ligating the uterine and ovarian arteries can be a life saving procedure and is not technically difficult or time consuming. Any persons doing Caesarean Sections regularly should familiarise themselves with these sites of ligation before an emergency arises, so as to gain confidence to apply these techniques should the need arise.

B-lynch suture: This involves tying up the uterus with stures, literally.

The technique can be summarised as follows:

1. General anaesthesia, urinary catheter in place and the patient in the Lloyd Davies position.
2. Pfannenstiel incision usually adequate.
3. Lower segment uterine incision (as for Caesarean Section) made after dissecting off the bladder.
4. Bimanual compression of the uterus to assess the potential chance of success of the B-Lynch suturing technique. If bimanual compression controls the bleeding as observed vaginally, the suture is placed.
5. A no.2 chromic suture on a round bodied needle is used to puncture the uterus about 3 cm below the right hand corner of the lower segment incision and brought out about 3 cm above the same corner (as one would place the first suture when closing this corner of the incision).
6. From this point the suture is passed over the right hand cornu of the uterus, approximately 3-4cm from the right corneal border, where it may be fixed to prevent it from slipping off the fundus, and then fed posteriorly and vertically down to the same level where the suture has previously left the uterine cavity from anterior.
7. The suture is then placed through the posterior uterine wall into the cavity under direct vision of the surgeon and back through the posterior wall about 4-5cm left of the previous entry site.
8. With the suture outside and posterior of the uterine cavity at this stage, it is now passed over the left hand cornu, approximate 3-4cm from the left corneal border, where again it may be fixed to the fundus, then fed anteriorly and vertically down to the level of the left corner of the lower segment incision.
9. The needle is then passed through the left corner in the same fashion as on the right hand side, to emerge below the incision margin on the left side.
10. With the suture now in place, the assistant bimanually compresses the uterus while the surgeon pulls the chromic suture taught.
11. If a third person confirms that the bleeding is controlled (as observed vaginally), the surgeon ties the suture to keep it in position and closes the lower segment uterine incision. **(Dr E Farrell)**

Enucleation of a submucous fibroid: A recent report describes the successful treatment of uterine atony by the enucleation of a submucous fibroid which was preventing the uterus from contracting.

Injection of tranexamic acid: Another case report describes the cessation of haemorrhage after intravenous injection of 1 g of tranexamic acid, a fibrinolytic inhibitor. The authors suggest that this drug may be particularly helpful in severe bleeding from the lower uterine segment when the fundus is already well contracted.

Injection of vasopressin: Local injection of Vasopressin (1 mL [= 5 IU] diluted with 19 mL NaCl 0.9%) six to seven infiltrates of 1 mL subendometrially at the site of placenta accrete has been described to stop bleeding when all other measures failed.(Samuel lurie)

Uterine artery embolisation: : This technique requires an experienced angiographic radiologist and it may be available only in specialist centres. This can be used for bleeding persisting after hysterectomy. It may also be used when hysterectomy is contraindicated or when the bleeding is from vaginal or cervical lacerations. Sciatic nerve damage is a rare complication, collateral circulation maintains tissue viability, and pregnancy can follow bilateral internal iliac embolisation.

When all methods fail, either internal iliac artery ligation or hysterectomy should be resorted to. Both are briefly described below:

Internal iliac artery ligation: Experiments in the 1960s by Burchell ascertained that the effect

of ligation of the internal iliacs was to convert the affected pelvic circulation to a venous system, thereby allowing clotting to develop and persist. The technique involves identifying the bifurcation of the common iliac artery, where the ureter crosses it.

 First of all the uterus needs to be lifted out of the operative field and, covered with a damp abdominal swab, retracted towards the contra-lateral side of the artery which is to be ligated. The peritoneum is then opened, usually between the round ligament and the Fallopian tube, and the opening extended to the pelvic side wall. The most easily identifiable structure is usually the external iliac artery, which can be followed cranially up to the ureter and bifurcation of the common iliac artery. The ureter is then retracted medially, and the internal iliac artery should be identified posterior to that by minimal careful dissection. The internal iliac vein should be visible as a large, non-pulsatile blue coloured structure just posterior and lateral to the artery and all precautions should be taken not to injure this structure, which can have disastrous consequences.The artery is ligated 2.5 cm distal to the bifurcation of internal and external iliacs. A rightangled clamp is passed gently behind the artery and appropriate non absorbable suture material is fed around the artery and two free ligatures tied 1.5 to 2 cm apart. The vessel is not divided. External iliac artery and femoral pulse must be identified before and after tying the ligatures. Internal iliac artery ligation offers a proximal intervention which should have a significant impact on uterine blood flow; however, it carries some risk of injury to the iliac veins which could exacerbate the bleeding problems. This procedure should be attempted by surgeons comfortable operating within the retroperitoneal space. In deciding to perform internal iliac artery ligation, the clinician must consider also whether the patient's condition will allow time for her to undergo this conservative procedure at the expense of a delay in definitive treatment.

Obstetric hysterectomy: In an emergency setting, it is fastest to "clamp, cut and drop" the pedicles to below the level of the uterine arteries, and then tie them off. To avoid damage to the ureter, the uterine arteries should be clamped high on the uterus and then successive smaller pedicles taken,

each inside the other down through the cardinal and uterosacral ligaments. While the organ is more vascular, the tissue planes are often more easily developed. Because the cervix may be difficult to palpate, it is best to open the vagina (if necessary with the aid of a double-gloved finger in the vagina) and then circumscribe the cervix. It is often advised to leave the vagina at least partially

open, with or without a drain, after securing the vaginal angles with figure of eight sutures and oversewing the edges of the vagina. While many reports suggest subtotal hysterectomy over total hysterectomy, it should be remembered that subtotal hysterectomy may not be effective for controlling bleeding from the lower segment, cervix, or vaginal fornices.

Some special situations: Some special situations merit mention and are described below:

Bleeding at the site of caesarian section in placenta praevia: Individual vessels in the placental bed may be ligated. Simple or box stitches may be placed where continuous oozing is present in placenta previa. If there is intractable bleeding, the lower uterine segment may be temporarily packed; leaving a pack in the uterus is also an option. Removal of a pack is a worrying moment because of concern that the raw uterine surface will bleed again. One case report has described a sterile plastic drape fashioned into a bag and inserted into the lower uterine segment and vagina before being packed with two lengths of 4.5×48 inch gauze packs soaked in povidone-iodine. The purpose of the plastic was to allow easy removal and in fact the packing was spontaneously expelled 16 h later with the onset of breastfeeding.

The end of the pack is fed through the cervix and into the vagina and is removed 24-36 hours later. Retained tissue may be removed under direct visualization. Abnormally adherent tissue is a concern; leave it in situ if it cannot be easily removed.

It is extremely important that one NEVER closes the abdomen of a bleeding patient with the plan to observe her for a few hours in the hope that the bleeding will subside by itself. These patients are often found hours later in a state of shock and run a real risk of dying.

Post-hysterectomy bleeding: Decreased coagulation combined with the trauma from prolonged manipulation may lead to haemorrhage from small sites even after hysterectomy; These may appear impossible to isolate and coagulate or suture. Bleeding vessels may retract deep into the pelvic retroperitoneal space and be difficult or impossible to isolate surgically. Intra-abdominal packs have been used for continued bleeding from peritoneal surfaces when hysterectomy has been done, a

consumptive coagulopathy exists, and there is continued widespread bleeding. The pelvis is

packed firmly with large laparotomy packs, which are then removed 24 hours later after correction of the coagulopathy. The pack could be brought out through the vagina for removal later Uterine artery embolisation is useful in post-hysterectomy bleeding. The placement of a suction drain may be useful to monitor losses in cases of ongoing oozing. Always consider coagulopathy in patients with continued slow blood loss.

Safe referral: Finally a word has to be mentioned about patients who go into PPH , but who cannot be managed at the primary center. The following precautions may help in preventing the deterioration of the patient during transfer: The patient should have at least 2 large bore intravenous lines in place, with either crystalloid or blood (where available) running in at 1000-2000ml per hour. Oxytocin 20 units should be added to a crystalloid solution before transfer. She should be on a 40% oxygen mask and should be accompanied by at least a registered nurse.

If the bleeding is from a uterine origin, the uterus (not the vagina!) should be packed with as many sterile abdominal swabs as one could fit into the cavity, to create a compression effect that would minimise the bleeding until the patient reaches the referral site. If the patient is not to be transferred far from the initial site, bimanual compression of the uterus by the accompanying person can be just as effective and possibly save valuable time on packing of the uterus. If the bleeding is due to vaginal/ cervical tears, packing of the vagina may indeed have a life-saving effect.