Practical tips for key health problems

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Preface My background: I came back to work in Zambia in 1973. This was the year of the oil crisis when the price of crude oil quadrupled overnight and still continued climbing. The copper price slumped. Zambia had 90% of its exports from copper and produced no oil so this was a double calamity. The copper price remained at this very low level for several decades. The setback was made worse when President Kaunda the same year outlawed all political parties apart from the governing party. This was also devastating for the economy. In 1983 Zambia was one of 37 countries so hard hit by the debt crisis that they were forced to reduce the health budget by 50% and the education budget by 25%. We at the Mpongwe Mission Hospital were struggling with an increasingly impossible financial situation. We were forced to look for simpler, cheaper solutions to our major health problems. I was inspired in this search by two brain waves: Shoemaker's book "Small is Beautiful"and a quote from Lord Rutherford to his staff when the famous Cavendish research laboratory in Cambridge was hit by a financial crisis: "We have no money; so we will have to think instead." I was also helped by the offer of monthly microfilm copies of 14 medical journals from a doctor in England provided I bought a microfilm reader. This was cheap and from this I gleaned phenomenal ideas to improve and cheapen our solutions for major health challenges.

Barriers to Health and the role of peoples' movements

The historian Arnold Toynbee has stated that the 20th century will be chiefly remembered in future centuries not as an age of political conflicts or technical inventions but as an age in which human society dared to think of the welfare of the whole human race as a practical objective. In the previous 10 000 years such an absurd thought would have been unthinkable by the majority of rulers and ruled alike. The century ended with the Millennium UN conference where countries united in launching the 8 Millennium Goals for advancing the welfare of all mankind.

References to: Sachs Jeffrey.The end of poverty. How we can make it happen in our lifetime. 2005 Penguin Books. London.

Some feel that they have the answer to the most important barriers to improving health care when they have identified one trap. They get so focussed on one trap that they miss the breadth of barriers that need to be broken through in order to improve health and development.This is needed when looking at what comes after 2015 and the end of theMDG period:

6 traps are major barriers to improved health and development

1. Poverty trap - p. 56 and 57 in Sachs

2. Debt trap - p. 59 debt overhang

3. Demographic trap - p. 64-66, Fig 1 p. 65

4. Gender trap - p. 60, 72

5. Disease trap - p. 86 esp malaria and HIV / AIDS in SSA map 11 - p. 196-200

6. Geographical and climate trap - p. 86 for Africa, 208;
contrast Great Britain 33-35

The breadth of changes can only be realized by coopting the best resources and inspiration of local communities in **people's movements**. Peoples' movements, can when best, stimulate a tidal wave of determination for intiating and sustaining change. This can be coupled to competent management and skilled clinical, public health and other development and health activists who dedicate themselves wholeheartedly to the needs of the poorest, unite with people's movements in ensuring that health and development benefits reach everyone.

A recent intervention in Nepal to encourage and initiate people's movements as study circles of pregnant women has had impressive results in both Maternal Mortality and Neonatal mortality.

Costello et al and Nepal study of Neonatal deaths and MMR - Lancet

Summary Background Neonatal deaths in developing countries make the largest

contribution to global mortality in children younger than 5 years. 90% of deliveries in the poorest quintile of households happen at home. We postulated that a community-based participatory intervention could significantly reduce neonatal mortality rates.
Methods We pair-matched 42 geopolitical clusters in Makwanpur district, Nepal, selected 12 pairs randomly, and randomly assigned one of each pair to intervention or control. In each intervention cluster (average population 7000), a female facilitator convened nine women's group meetings every month. The facilitator supported groups through an action-learning cycle in which they **identified local perinatal problems** and **formulated strategies to address them**. We monitored birth outcomes in a cohort of 28 931 women, of whom 8% joined the groups. The primary outcome was neonatal mortality rate. Other outcomes included stillbirths and maternal deaths, uptake of antenatal and delivery services, home care practices, infant morbidity, and health-care seeking. Analysis was by intention to treat. The study is registered as an International Standard Randomised Controlled Trial, number ISRCTN31137309.
Findings From 2001 to 2003, the **neonatal mortality rate was 26·2 per 1000** (76 deaths per 2899 livebirths) in **intervention clusters** compared with **36·9 per 1000** (119 deaths per 3226 livebirths) **in controls** (adjusted odds ratio 0·70 [95% CI 0·53–0·94]). Stillbirth rates were similar in both groups. The **maternal mortality ratio was 69 per 100000** (two deaths per 2899 livebirths) in **intervention clusters** compared with **341 per 100000** (11 deaths per 3226 livebirths) in **control clusters** (0·22 [0·05–0·90]). Women in intervention clusters were more likely to have antenatal care, institutional delivery, trained birth attendance, and hygienic care than were controls. The intervention reduced NMR by 30%; MMR by 80%.

These preliminary impressive results are now being tested in several other settings and the first results from India were equally impressive but from Bangladesh less so. Bigger studies are underway.

To change radically the desperate plight of the 1 billion poorest and most deprived people in the world there will need to be not just thousands, but tens of thousands of people's movements similar to the ones that in Sweden in the late 1800's transformed the prospects of the utterly destitute and the most deprived. There will need to be not just tens of thousands but millions of people in these movements who catch the vision of a better, healthier and more equitable future for all mankind.

Obstetrics and Gynaecology when resources are scarce

Obstetric care has been the one sector within health care that has lagged behind in the progress that has been recorded in Global Health within the last 3 decades. Whereas child mortality has halved in this period and likewise women's fertility, with the largest increase in life expectancy in human history, maternal mortality globally had remained unchanged at 430 women dying per 100 000 live born (1) until recently when in 2010 this figure had reduced to a Global Maternal Mortality Ratio of 210/100 000 live born with 287 000 maternal deaths that year (3).
Women are dying in pregnancy related complications of foreseeable reasons and in foreseeable numbers. Out of the 210 million pregnancies each year about 15% will develop complications and 1.7% will die. However we cannot know beforehand which

woman will die in the Peruvian highlands or the slums of Kolkata. These women are not dying of diseases, they are dying because they are women and it is their lot to reproduce and give birth to children. Most who die are illiterate, do not own any land, cannot start a shop and usually cannot decide if and with whom they will become pregnant.

This results in 287 000 deaths a year (all but 1% in developing countries) with 85% of these deaths occurring in Sub-Saharan Africa and South Asia (1). There are 50 million injuries and illnesses as a result of pregnancy and delivery. 15 million will have longterm disability (2). The **lifetime risk** for women in low-income-countries is considerable.
In Sierra Leone 1 in 6 will die a maternal death, in Mali 1 in 7, in the whole of Africa 1 in 16, whereas the figure for Asia is 1 in 54, for Latin America 1 in 73 and for Ireland it is 1 in 48 000. The global risk is 1 in 92 (1).
There have been **6 major advances in bringing down maternal mortality ratio globally:**

1. Introduction widely of a **practical partogram with strict use of the "Alert" and "Action" lines**.
2. Value and implementation of **supportive continuous presence of committed midwives** during labour and delivery. These must be trained at all levels in use of appropriate vacuum extraction.
3. Improving the **availability of well trained staff at first referral level hospitals.**
4. Introduction and use of an **easier, better method for Caesarean section (Misgav Ladach)** where needed.
5. Training and use where indicated of **Symphysiotomy as alternative to C/S**
6. Training and use of **Shivcar method for treating severe post-partum haemorrhage using a condom and a Foley catheter.**

References

1. Maternal mortality in 2005: estimates developed by WHO, UNICEF, UNFPA and the World Bank. Geneva: WHO Press 2007.
2. The Johns Hopkins and IFRC Public Health Guide for emergencies. Geneva: IFRC Press. 2000: 11-5
3. Trends in Maternal Mortality: 1990-2010 WHO, UNICEF, UNFPA, World Bank. Geneva WHO press 2012.

Misgav Ladach (name means refuge in desperate hours) method of Caesarean section.

Recently some new thinking has led to the launching of a package of refinements put together by Dr. Michael Stark and given the name: the Misgav Ladach method which incorporates fresh ideas from various sources both surgical and gynaecological. The name is from the hospital in Jerusalem where the method has evolved, beginning in 1983.

The new method grew out of an approach to opening the abdomen developed by Professor Joel Cohen for abdominal hysterectomy in 1954 and popularized in his monograph "Abdominal and Vaginal Hysterectomy" in 1972 (1). This method of opening the abdomen has been practised by a number of obstetricians for Caesarean sections following Stark's lead but to this he has added a number of new features which combine to make a package of refinements which had not been previously used. In the Pfannenstiel method the body is perceived as static and the incision cuts its way through with little

regard to structural anatomy whereas in the Joel-Cohen incision the anatomical structures are respected and the opening follows the principles of surgical minimalism.

The claimed advantages of the Misgav Ladach method as shown in non-randomized trials are impressive: less bleeding, quicker, easier to learn, less instruments, less pain after surgery, quicker discharge from hospital, less infections, less risks of adhesions after surgery. These claims have now been tested in at least 9 randomized controlled trials (RCT) many of which have now been published. The first was in the Department of Women's and Children's Health at Uppsala University Hospital, Sweden and reported by Elisabeth Darj and Marie-Louise Nordström (7). Other RCTs have been carried out in Dar-es-Salaam -Tanzania (8), Beijing -China (9), Vellore -India (10), Kampala -Uganda (11), Wuhan -China (12), Nairobi -Kenya (13), Magdeburg -Germany (14), Porto -Portugal (15) and a number of other centres around the world. The method in virtually all these trials is found to be significantly quicker to perform than the Pfannenstiel method with a reduced amount of bleeding and diminished postoperative pain.

Misgav Ladach Method of Cesarean Section

(name means refuge in desperate hours)

Introduction

"Embedded in the name Cesarean section lies an aura of greatness, something elevated above the mundane. This is a name worthy of the operation by which it is possible under certain circumstances to save two lives otherwise destined indisputably for a certain death". These words by the future Professor of Obstetrics and Surgery at Uppsala University, Karl Gustaf Lennander in 1889 show the standing of this operation even at that early stage. Two decades prior to this, the maternal death rate following Cesarean section was estimated at 75%.

When Murdoch Cameron (Glasgow) in 1878 managed to carry out eight consecutive sections without a single maternal death by suturing the uterus (refining the classical uterine incision of Sänger) this was seen as a major breakthrough. Prior to this Porro in Milan (1876) had already introduced the operation of Cesarean section with sub-total amputation of the uterus. This saved the life of the mother but precluded any further pregnancies.

Munro Kerr in Glasgow had modified an operation developed by Krönig (transperitoneal lower segment section with extraperitoneal closure) and in 1911 introduced his method of transverse incision in the lower uterus. He further refined the method and slowly it won international acceptance but it was not until 1949 when the overwhelming majority accepted it as the standard procedure. This occurred at the 12th British Congress of Obstetrics and Gynecology and when there was general assent to his method, Munro Kerr leaped to his feet proclaiming: "Allelujah! The strife is o'er the battle done".

One variation in his method was the use of the lower transverse abdominal incision introduced by Pfannenstiel in 1896 and published in 1900. Because of cosmetic

considerations and a decrease in wound hernias, this method has gradually become standard in many developed countries. However it has some disadvantages. It may be too slow for emergency sections. The subaponeurotic dissection of the rectus sheath takes time. It is sometimes accompanied by troublesome bleeding from perforating vessels. Postoperative haematomata and abscess formation are not unknown such that some surgeons routinely drain this space. Since it does not strictly follow Langer's lines it may be accompanied by unsightly guttering when the patient stands erect, if the repair at the end of the operation is not meticulous.

Apart from minor improvements the basic method of Cesarean section has not changed over the last generation. This is undoubtedly due to it being a safe and effective method of delivery of a baby that cannot be delivered vaginally.

Recently some new thinking has led to the launching of a package of refinements put together by Dr. Michael Stark and given the name: the Misgav Ladach method which incorporates fresh ideas from various sources both surgical and gynaecological. The name is from the hospital in Jerusalem where the method has evolved, beginning in 1983.

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The claimed advantages of the Misgav Ladach method as shown in non-randomized trials are impressive (see below). These claims have now been tested in at least 9 randomized controlled trials (RCT) many of which have now been published. The first was in the Department of Women's and Children's Health at Uppsala University Hospital, Sweden and reported by Elisabeth Darj and Marie-Louise Nordström (7). Other RCTs have been carried out in Dar-es-Salaam -Tanzania (8), Beijing -China (9), Vellore -India (10), Kampala -Uganda (11), Wuhan -China (12), Nairobi -Kenya (13), Magdeburg -Germany (14), Porto -Portugal (15) and a number of other centres around the world. The method in virtually all these trials is found to be significantly quicker to perform than the Pfannenstiel method with a reduced amount of bleeding and diminished postoperative pain.

The recent Cochrane review of the RCTs of the method comparing it with other methods concludes that this is a better method than previous methods and therefore worth recommending. The conclusion was that Joel-Cohen-based CS (Misgav Ladach) compared with Pfannenstiel CS was associated with reduced blood loss, operating time, time to oral intake, fever, duration of postoperative pain, analgesic injections, and time from skin incision to birth of the baby. Misgav-Ladach compared with

the traditional method was associated with reduced blood loss, operating time, time to mobilization, and length of postoperative stay for the mother. Joel-Cohen-based methods have advantages compared with Pfannenstiel and traditional (lower midline) CS techniques. (35, 36, 37,38).

Knowledge of the method spread after the FIGO World Congress of Gynecology and Obstetrics in Montreal in September 1994. At the follow-up FIGO Congress in August 1997 in Copenhagen, four presentations showed the advantages of the method. It is already the standard method recommended in a number of countries such as Sweden and Denmark.

Philosophy behind the new method developed by Dr. Michael Stark This method is based on some important philosophical considerations. The first principle is that of ***surgical minimalism.*** Only those surgical manoevres that are shown to be necessary will be used and wherever possible the alternative is chosen that is the least disruptive to the tissues. Thus dissection of subcutaneous tissues and suturing of the peritoneum are avoided. There is less cutting and more separation of tissues. The second principle is that of ***operating in harmony with physiological and anatomical considerations***. Thus the level of the skin incision and the level of separation of the recti muscles is chosen carefully to be well away from muscle insertion sites. This means that the least force is needed at separation and the least disruption is likely of blood vessels and nerves which are most vulnerable near the site of muscle fixation. Also the direction of pull when opening is such that vessels and nerves are preserved and the bladder and underlying bowel are not jeopardized. It is a method that has considerable advantages both for high income and low income countries.

Here are the main advantages claimed for the new method:

* It causes less bleeding than a traditional Cesarean Section (2,3,4,7,8,9,11,12) and the doctors at the Misgav Ladach Hospital never gave a blood transfusion for an uncomplicated operation. This would be a great saving not least in a setting with a high prevalence of HIV. Less bleeding and less cutting also reduces the risk of the operator sustaining a wound during the operation with the subsequent risk of HIV infection from the patient.
* It is a method that is easier to learn and easier to use than the standard methods.
* The wound after the operation is stronger than in a lower midline incision and virtually eliminates the risk of a wound hernia which is a major disability in women with a heavy work load.
* It is quicker than the traditional method with faster delivery of the infant and shorter overall operating time taking on average 10-15 minutes in skilled hands in an uncomplicated case (7,8,9,11,12,13,14,15). This saves theatre and staff time. The anaesthetic needed can be shorter.
* It is the best way of dealing with many of the unexpected complications that can arise during a Cesarean Section in a low-income country. There is great flexibility in modifying the method to deal with unexpected situations.
* It causes less infection after the operation and thus reduces the need for antibiotics (8,11,13).
* It causes less febrile reactions during the post-operative period which is a sign of how

gentle the operation is with the tissues (4,6).
* It allows early ambulation of the patient which reduces complications such as deep vein thrombosis. (4,6,14).
* It allows early discharge from hospital thus freeing beds early.
* It allows early alimentation and thus removes the need for post-operative starvation and intra-venous fluids (5,13,).
* It is the method with the least amount of post-operative pain and thus reduces the need for post-operative analgesia(4,6,13,14). This is important to allow patients to be back soon in full function within the family and community. It also allows breast-feeding to start early.
* The scar is less likely to cause keloid formation which is a particular hazard in Africa (17). * There is less danger of peritoneal adhesions, and scar tissue in the subcutaneous tissues thus making a repeat section much easier (4,6).
* It requires only 10 instruments and 3 sutures.

There are some theoretical disadvantages in the method:

1. Because the abdominal scar is slightly higher than a Pfannenstiel incision there may be women who will not like it because they wish to hide the scar even under the skimpiest bikini. This will not be a factor in low-income-countries and the fact that the method has proved very popular in Israel and Italy which are high income countries makes this unlikely to be a major disadvantage.
2. Until it is widely accepted as the standard method there may be some confusion because of introducing a new method. This is always the case in introducing new ideas in medicine and is compounded by the inherent conservatism of the medical profession.
3. It has only been tried in limited numbers under local anaesthesia alone which is the method used in some units in some poor countries. However the list of advantages so outweighs these theoretical disadvantages (especially in low-income countries) that this method of Cesarean Section should become the standard method in all countries.

Standard procedure The surgeon stands on the right side of the patient if he is right-handed or the left side if left-handed. The abdominal incision is a straight transverse superficial incision in the skin about 3 cm. below the line joining the anterior superior iliac spines. It can be higher if necessary and there are even advantages in going at the same level as the anterior superior iliac spines. It will need to be about 17 cms. in length (Fig. 20)

Identify the midline and pinch three marks in the skin crease, one in the midline and one at either end of your planned incision. Stretch the skin slightly sideways in the direction of the skin crease. Stretching the skin in this way gives less distortion and a straighter incision. Cut through the skin only and not into the subcutaneous tissue in the full length of the incision (17 cms. in length). This shallow incision hardly bleeds at all and never needs haemostasis. Deepen the incision in the midline with the knife in a short transverse cut of about 2-3 cms. through the fat, down to the rectus sheath. Do not attempt any freeing of the subcutaneous tissue. The blood vessels in the subcutaneous tissue and fat are left alone and in the midline there is virtually a bloodless field. Make a small transverse incision in the rectus sheath with the knife (Fig. 21).

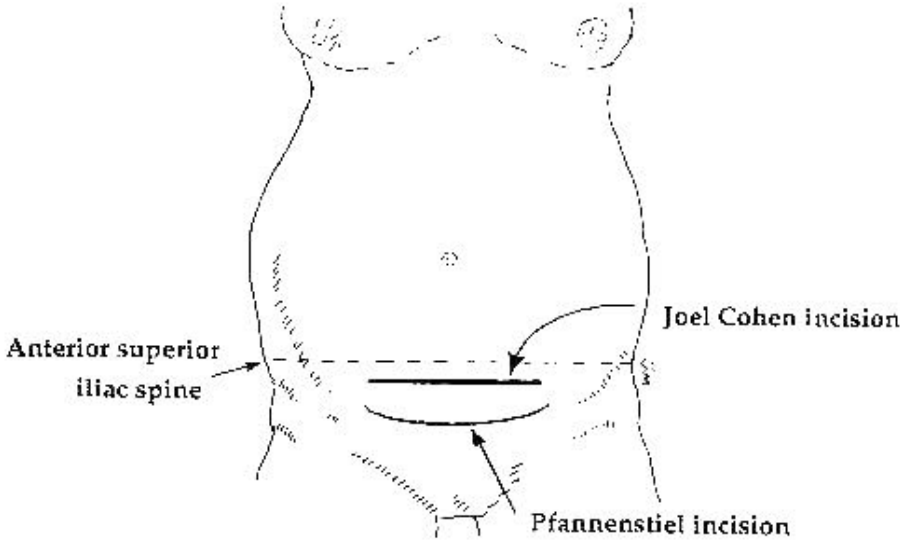

Fig. 1. Level of incision.

Enlarge the transverse incision bilaterally underneath the fat and subcutaneous tissue without disturbing them. Place the tip of a partly open pair of scissors (supported underneath by your left index finger) with one blade under the cut sheath and one blade above. Push the scissors along the direction of the fibres in a transverse direction following the curvature of the body as you go further out. Do this away from you and then towards you (Fig. 22).

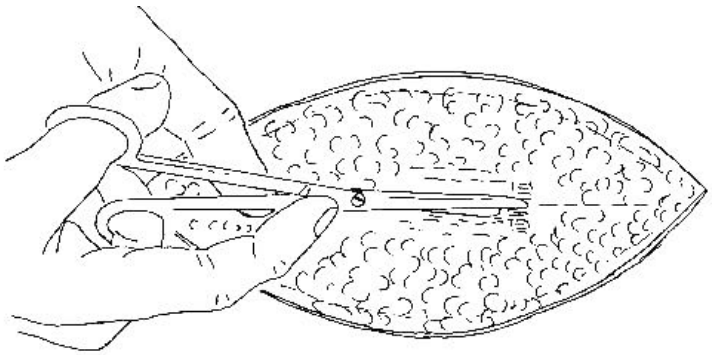

Fig. 3. Split the rectus sheath.

At this level the rectus muscle does not need separation from the overlying sheath and it is above the level of the pyramidalis muscle. Gently separate the fascial borders caudally and cranially, using the fingers to make room for the next step (Fig. 4).

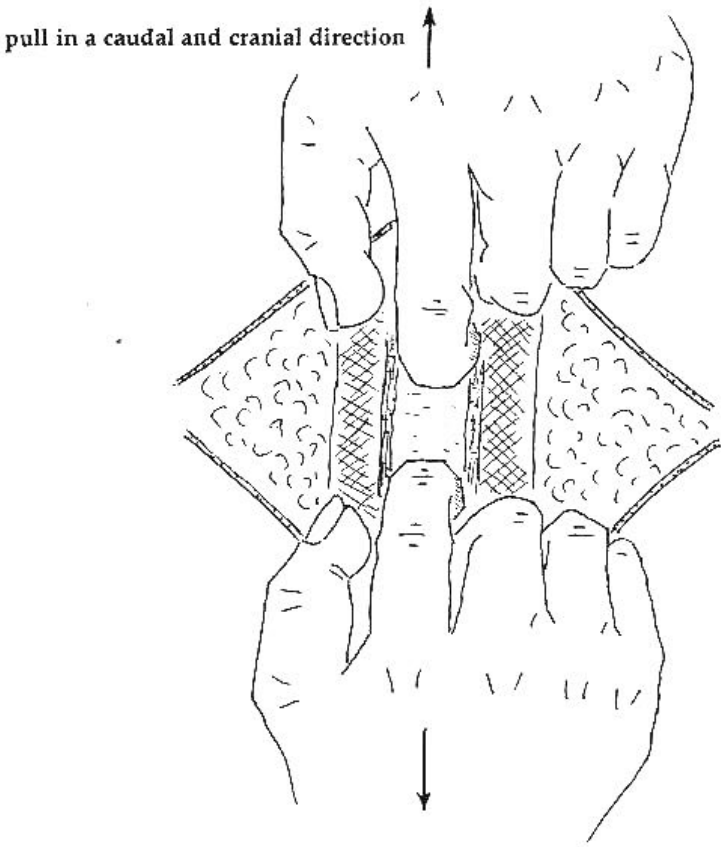

Fig. 4. Open up the rectus sheath.

This makes an oval opening that exposes the rectus muscle underneath. Pull the rectus muscles apart. Both surgeon and assistant push their index and middle fingers in the midline between the rectus muscles, encircling the whole muscle bellies and then pull with smooth, balanced and increasing force. It is often necessary for both to place their other index and middle fingers over the two that are in the gap in order to get the force needed to make a big enough hole. Do not be afraid of pulling quite hard, and sometimes you will almost lift the patient from the table at this point (Fig. 5).
Now you have all the big vessels and nerves well tucked under the protective layer of

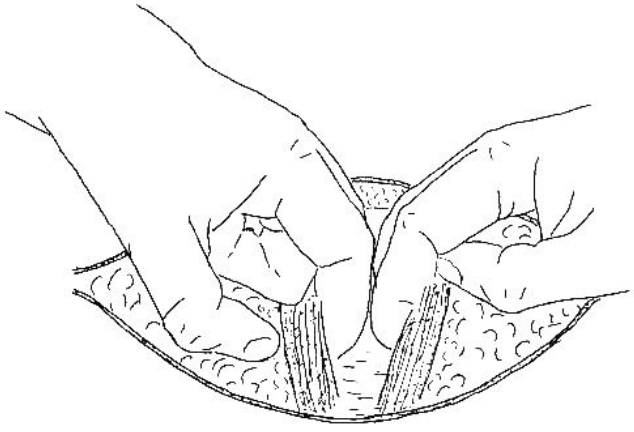

Fig. 5. Separate the rectus muscles.

subcutaneous tissue.

Stretch the parietal peritoneum open in a transverse way, using your index fingers to stretch the tissues until a small hole is made. Enlarge this hole by stretching it with your two index fingers in a caudal and cranial direction simultaneously (Fig. 6).

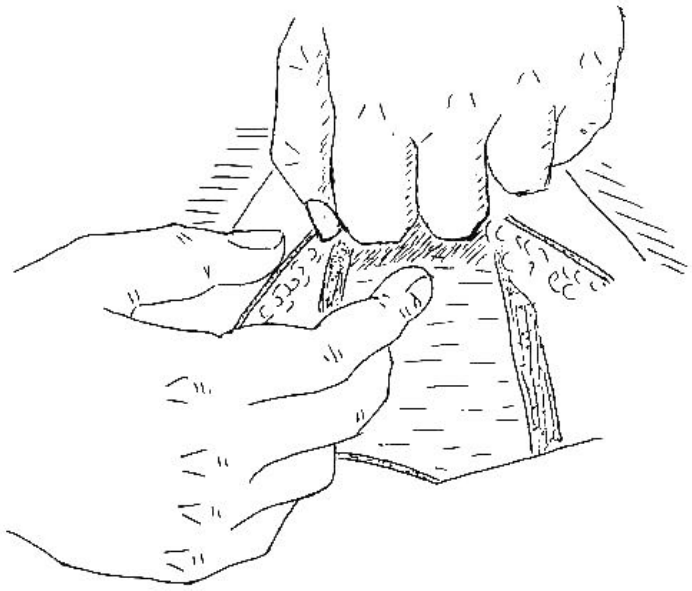

Fig. 6. Open the parietal peritoneum.

This opening can be made as high as is easily accessible since it will not be sutured. The opening of the peritoneum will be transverse and thus save the bladder from injury. Using the fingers to open and enlarge saves the underlying bowel from injury. Identify the lower segment of the uterus* and the upper limit of the bladder. *This is defined as that part of the uterus which lies below the level at which the peritoneum on the anterior surface of the uterus ceases to be intimately applied to the uterus and is reflected via the uterovesical fold on to the dome of the bladder.

Make a transverse superficial incision through the visceral peritoneum 1 cm. above the bladder limit with the scalpel. Avoid blood vessels and go out far enough on either side (about 10-12 cms in total) so that the head and baby can be delivered through the hole. Use a mobile retractor (such as Fritsch or Doyen's) to give good visibility with the assistant following your movement as you cut with the scalpel. The exact level is not so critical and it is unwise to go so far down so that the opening in the uterus is restricted out to the sides.

Push the visceral peritoneum and bladder down using two fingers. Fingers are less traumatic and more sensitive than a swab or instrument and cannot go through the bladder.

Make a small transverse incision in the lower uterine segment with a scalpel or using your right index finger make a hole until the membranes bulge through. Often the membranes break and amniotic fluid pours out at this stage.

Stretch the hole transversely to either side using your right thumb mainly to steady and your left index finger to separate the uterine muscle fibres. Open more to the right than the left since the uterus is usually rotated towards the right. If a bigger hole is needed for a mal-presentation or a large baby, then the uterine cut can be turned slightly upwards with scissors. The thumb is broader than the index finger and is less likely to damage the

vessels on the left side of the uterus.
Place two fingers below the head and release the vacuum between the head and the lower uterine wall if labour is already established. The assistant now pushes on the fundus of the uterus in order to bring the baby down and your fingers guide the head out of the uterine opening. Two fingers take less room than a whole hand and thus are less likely to cause a widening tear in the uterus. Alternatively you can deliver the head guiding with a single blade of forceps placed behind the head. This takes up minimal space.
Manually remove the placenta after delivering the baby, by placing your whole hand inside the uterine cavity and gently freeing the placenta from its bed. At this point the anaesthetist may give 10 units oxytocin (this is commonly not necessary). The manual removal makes the third stage of the delivery much quicker and often in the same movement the uterus is brought out of the abdomen (otherwise follow next section 16.) Oxytocin or ergometrine use is not always necessary as massage of the uterus is so effective in stopping bleeding from the placental bed.
Bring the upper uterus out of the abdominal wound by placing your whole hand behind the uterus.
Massage the uterus to stimulate contraction, and if there is vigorous bleeding from the placental bed, squeeze the uterus between your palms Some gynaecologists prefer to let the uterus remain inside the abdominal cavity especially if local anaesthesia is used since the action of bringing out the uterus may be painful and may cause vomiting.
Clean out the inside of the uterus with a towel to remove any remnants of membranes and further stimulate contraction and retraction of the uterus.
Grasp the centre of the caudal part of the cut uterine edge with a non-traumatic clamp such as Green-Armytage or Babcock clamp. Dilate the cervix with a thick Hegar's dilator if she is not in labour (some gynaecologists question this step in a community with a high incidence of genital infections since in theory it could spread bacteria from the vagina to the uterus).
Repair the cut uterine wall with a one-layer repair using a continuous locked stitch. Start at the lower edge of the cut nearest yourself and use a long length of chromic catgut No.1 on a round-bodied needle with a large diameter. Take big enough bites from the lower to the upper edge to get secure haemostasis but being careful on the lower edge to keep well away from the bladder (Fig 7).

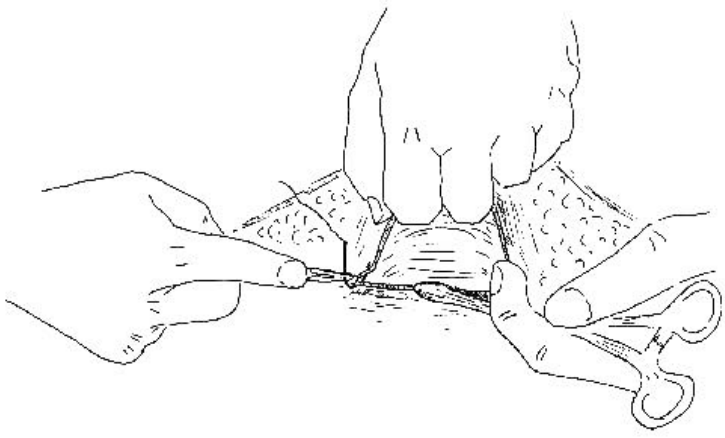

Fig. 7. Suture the uterus.

In special circumstances where the lower segment is especially thin or fragile or where it is especially thick there may be a need for a second layer but this is uncommon. Closure in a single layer not only saves time but also gives less ischaemia and gives better healing with less sacculation. It may also reduce the incidence of febrile morbidity. Using a locked stitch is surprisingly not associated with local ischaemia since retraction of the uterus reduces tissue volume and thus releases any tension around the stitch within a few hours.

Check that all bleeding has stopped and that the blood pressure is normal so that haemostasis is not threatened after the operation. If necessary add single cross stitches to stop any small bleeding points. If you close the wound while the blood pressure is still low, bleeding may start when the blood pressure returns to normal.

Remove blood clots but do not put packs or towels into the peritoneal cavity to try to mop up all the liquid blood. Liquid blood is absorbed by the peritoneum. The amniotic fluid that is spilled into the peritoneal cavity has a bacteriostatic effect. The minimal interference with the bowel is important in allowing early alimentation.

Leave visceral peritoneum unstitched. Bring down the omentum to cover the repaired uterine wall. Leaving the peritoneum open is the most important step to stop adhesions developing. The peritoneum heals itself better without stitching and within 12 hours has already begun to come together as the coelomic cells reconstructed the peritoneum.

Leave the parietal peritoneum unstitched. It is probable that the stitching of the peritoneum leads to local ischaemia which stimulates a repair response by the body causing scar tissue and adhesions.

Identify the two layers of the fascia at either corner and grasp them with artery forceps. Use two more forceps on the upper and lower cut edges two-thirds of the way along the fascial cut.

Start stitching the fascia at the end of the cut nearest you. Start the stitch from the inside out on the upper border and then from the outside in on the lower border so that the knot is buried inside the fascia. Use chromic catgut No.1 or an equivalent that is strong enough to withstand the tension of early ambulation. Each bite goes slightly diagonally across the cut. Use a continuous running suture which need not be a locked suture unless there are special reasons. Do not interfere with the blood supply at either end by going beyond the end of the cut (Fig 8).

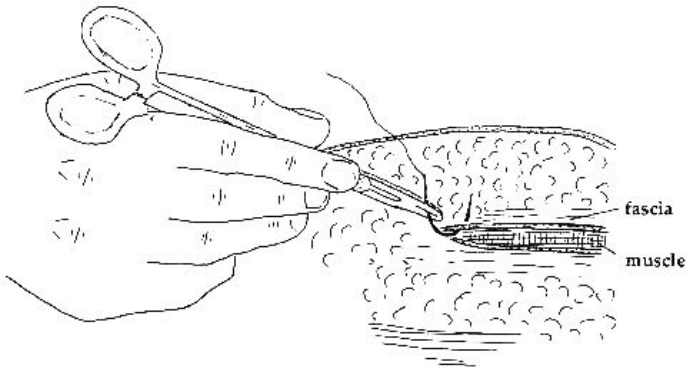

Fig. 8. Suture the rectus sheath.

Close the skin using two or maximum three mattress sutures.

Pinch the skin together with Allis forceps in the interval between the sutures so that each edge is exactly apposed to the other. Leave the Allis forceps on for about 10 minutes and

then remove them. The edges will now stick to each other. This type of very simple repair saves time, reduces the incidence of keloids and gives the best scar.
Start fluids immediately and get the patient out of bed as soon as the anaesthetic has worn off. There is no need for post-operative starvation, and ileus after this method is rare. Early mobilization reduces the risk of deep vein thrombosis and shortens post-operative pain. Remove the stitches on the 5th. post operative day. This early removal of stitches reduces the risk of infection and keloids. There is now no place in obstetrics for the use of a classical Cesarean section.

Difficulties

1. Previous Cesarean section. Even if a previous section was a midline lower abdominal incision or a Pfannenstiel incision the Misgav Ladach method is the best for a repeat section.

2. If there is scarring in the tissues down to the peritoneum use your fingers to free the scarring. More force may be necessary when separating the fascia.

3. If there are peritoneal adhesions try to free these using your fingers only, but sometimes cutting them will be necessary. Here it is even more important to keep away from the bladder. If these adhesions are so dense that the baby cannot be delivered through a lower segment uterine incision make a transverse incision through the upper segment.

4. If there is a Bandl's ring and the baby is above this ring make the uterine opening a transverse incision in the upper segment just above the ring.

5. If there is a Bandl's ring around the baby's neck it is best to try to get the baby out as in 4. but sometimes it will be necessary to make a vertical incision down from the transverse incision i.e. making a "T" incision. This does not heal as well and thus every further pregnancy will need a Cesarean section at delivery.

6. If there is a very thin lower segment this could tear during the delivery of the baby. Try to keep to the upper part of the lower uterine segment when making your transverse incision.

7. If there is placenta praevia go through the placenta when opening the lower segment and quickly deliver the baby to reduce the bleeding. Then proceed immediately to manual removal of placenta and, if necessary, squeezing the uterus between your palms to stop the bleeding.

8. If there is transverse lie use a transverse lower uterine incision. Do a breech extraction by putting your hand inside the uterus and grasping the baby's foot (and even better both feet) and then pulling it through your uterine incision. If the baby's head is readily available sometimes the head can be delivered first.

9. If there is a transverse lie with an arm prolapse and the baby is alive there will be more danger of the lower segment tearing out towards the major vessels during delivery. It is safer to make a transverse incision through the upper segment of the uterus and deliver the baby by breech extraction bringing the baby's arm up prior to delivery of the head. If the baby is dead and there is no risk of uterine rupture a destructive procedure with sawing off the head and arm together is safer for the mother.

10. If the baby presents as a breech follow the same method as in 8. Do a breech extraction by putting your hand inside the uterus and grasping the baby's foot (and even

better both feet) and then pulling it through your uterine incision.
11. If there are twins with head presentation deliver them as usual but if they present as breech or transverse lie, put your hand inside the uterus and grasp the feet and deliver them by breech extraction.
12. If the head is jammed in the pelvis you may need an assistant to push the head up in order to deliver it through the uterine incision.
13. If there is a prolapsed cord this method of Cesarean section is especially advantageous since the baby is out so quickly. Prior to starting the operation have the mother in a knee-elbow position with a nurse pushing the head up to keep the pressure off the cord.
14. If there is abruptio placentae with a live baby this method of Cesarean section is an advantage because of the rapid delivery of the baby and the rapid haemostasis under direct vision. If the baby is dead avoid Cesarean section if possible.
15. If her bladder opens, identify the hole carefully, hold its edges with Allis forceps, mobilize the surrounding tissues if necessary, and bring together the edges with continuous inverting sutures of fine chromic catgut or other absorbable suture material. Put in a second inverting layer to stop any leakage of urine.
16. If there is already evidence of intramniotic infection (prolonged rupture of membranes, prolonged difficult labour, fever or foul smelling liquor) start antibiotics immediately intravenously using whatever is suitable in your situation. Benzyl penicillin with an aminoglycoside such as gentamicin may be suitable, as may be chloramphenicol. If there is risk of traumatized anoxic tissue add metronidazole given intravenously or rectally. In this situation ignore the advice given above about not cleaning out liquid blood in the peritoneal cavity since this may contain septic material. Infected blood in the peritoneal cavity needs to be removed and so careful cleaning, even accepting some bowel dysfunction afterwards, is important. Any clots that remain can be an important nidus of infection.
17. If the lower segment tears as you deliver the baby it is likely to tear in the corner which will run down behind her bladder, often with heavy bleeding. Get your assistant to firmly compress the aorta with the thumb while you identify the edges of the incision and the tear. Mobilize her bladder further down if necessary. Grasp the edges with Armytage forceps. If you can get to the corner of the tear without endangering the ureter, suture the edges together with chromic catgut as in the method description above. *
If the uterine vessels are damaged a cross stitch will be needed to stop the bleeding. *
If it is impossible to stop the bleeding use the method of inserting a condom into the uterine cavity (as described above in the section on post-partum haemorrhage) connected with a rubber tube and inflating with 250 - 500 mls of normal saline (Fig.11).
* ***If even this fails*** go to a mass ligation of the uterine arteries (see section on post-partum haemorrhage Fig. 12)

This method description together with that of symphysiotomy should be combined with the use of the DVD containing 5 films of operations to improve maternal health care.These include symphysiotomy, the Misgav Ladach methods of Cesarean section and of Abdominal hysterectomy and two films about the repair of obstetrical fistulae. These have been produced under the auspices of the Department of Women's and Children's Health at Uppsala University, Sweden and available free from Teaching Aids at low cost; TALC, http://

www.talcuk.org/index.htm **or from Dr. Gunnar Holmgren: E-mail mpongwekid@gmail.com, Department of Infectious Diseases, Ryhov County Hospital, SE-551 85 Jönköping, Sweden.**

The recent Cochrane review of the RCTs of the method comparing it with other methods concludes that this is a better method than previous methods and therefore worth recommending. In settings of scarce resources it saves money by taking less time for the operation and thus shortens the anaesthetic, less bleeding and thus less need for transfusion, less sutures, less postoperative pain thereby less need of analgesics, less postoperative infections and thereby less need for antibiotics, shorter stay for patients in hospital. It is also easier to learn and to teach.

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Close attendance at delivery

Another idea shown to be successful by O'Driscoll at the Rotunda Hospital in Dublin is that continuous supportive attendance of a midwife or a relative at the bedside of delivering women improved the outcome and vastly reduced the rate of Caesarean sections. The outcome was a significant lowering of delivery costs. This inovation could globally transform many delivery units.

Symphysiotomy as alternative to Caesarean section

The modern focus on micro-surgery and minimal invasive procedures in many fields of operative medical care has its parallel within operative obstetrics in the method of symphysiotomy. Until Cesarean section ceased to be a major threat to the life and health of the mother, symphysiotomy was widely used in most countries around the world. As recently as 1948 Munro Kerr, the father of the lower-segment cesarean section method, praised symphysiotomy as a good method in certain circumstances. The method was abandoned in the 1950's and 60's in Europe not for scientific reasons but on emotional and irrational grounds. The impression was that the method caused long-term morbidity in the mother giving her an unstable pelvic ring and a risk of urinary incontinence.

The recent meta-analysis by Kenneth Björklund (1) of all the best studies done on the method from 1900-2000 (5000 operations) examined the evidence of short-term and long-term morbidity. This showed that symphysiotomy is not an obsolete method with significant danger to the long-term health of the mother. In fact it has levels of morbidity generally lower than those of Cesarean section when both are carried out by skilled operators for the right indications. The evidence is impressive enough such that WHO has given its stamp of approval to the renaissance of this method within modern obstetrics.

Even in high-income-countries there are three situations where its return would be appropriate: in severe shoulder dystocia, in the stuck after-coming head of a breech delivery when the usual interventions have failed (a stuck breech delivery still occurs in an unplanned way in all countries even with the acceptance of Cesarean section as the norm for breech delivery), and in the rare cases of those who refuse an abdominal

operation often because of cultural issues.
Of course like all invasive procedures symphysiotomy can cause harm if done wrongly or for the wrong reasons. The skills, when using the method, need to be learned, if possible, by assisting an experienced operator. The indications for the procedure and even more importantly, the contraindications need to be studied carefully.

To the classical indication of obstructed labour has been added recently the evidence emerging from research at the Mulago Teaching Hospital in Kampala, Uganda by Kenneth Björklund et al. This research was in a randomized controlled trial comparing the least traumatic method for Cesarean section, the Misgav Ladach method, with the lower midline method. This study, apart from the main end-point, showed that women in the later stages of HIV infection, even with the least traumatic method, had high morbidity which could be life-threatening when subjected to a cesarean section. This was in a unit with excellent operative skills (2).
Thus the advice usually given in high income countries that all women with HIV infection should be delivered by a Cesarean section may need to be turned on its head. In late stage HIV infection, Cesarean section may be contraindicated when there is an alternative such as symphysiotomy. This controversial conclusion may need to be tested in wider studies but there is no doubt that Cesarean section in late stage HIV infection can be a major threat to the life and health of the mother. This may outweigh the advantages in reducing Mother to Child Transmission (MTCT) of HIV. Of course if possible short-term anti-retroviral treatment should be given to mother and child to reduce MTCT.

Indications
As an alternative to Cesarean section in patients who :
•are not likely to limit the number of children to 4
•probably will not come to hospital for the next delivery
•have cultural problems accepting Cesarean section in a culture where vaginal delivery is all-important
•present within minutes of the head getting stuck in a breech delivery with a live baby
•When the shoulders get badly stuck after the head has been delivered.
•need a Cesarean section but because of prolonged labour and intraamniotic infection have a high risk of subsequent peritonitis.

Rules
1. Do not delay the decision about symphysiotomy when waiting threatens the life of mother and child.
2. The patient must be willing to cooperate.
3. Its main use is in primipara, where its benefits will be seen at every subsequent delivery. There is a somewhat higher frequency of complications in multipara.
4. The best results are when the child weighs 2.7 to 3.6 kg. In a smaller baby there is risk of damage to the child during the delivery. In a large baby there is a risk of causing pelvic instability. A symphysis-fundal height of 30-38 cms. gives a rough estimate of a baby between 2.5-4 kg. (twins and hydramnios excluded).

5. The cervix is at least 8 cm open in a primip or 7 cm in a multip.
6. The head is not more than 3/5 above the brim with minimal moulding or 2/5 above with marked moulding. There should be no overlap of the foetal head when the flat of the hand is placed along the anterior surface of the symphysis pubis and the lower abdominal wall.
7. Where foetal distress is severe a very quick Cesarean section in certain circumstances with good facilities may be less traumatic and safer for the baby. However in the most constrained circumstances getting a section done may be dangerously time consuming.

Standard procedure (3,4,5,6,7,8,9,10) - Fig 9

• Put the patient into a lithotomy position where the knees are fixed such that the angle between the thighs is around 80^0 and absolutely not more then 90^0. The knees are held by two assistants or put into firm leg-supports with non-elastic bandage holding them at 80^0. Stand between the patient's legs.
• Catheterize with an indwelling catheter. If you have a choice use a catheter with a firm consistency to make it easier to feel vaginally.
• Infiltrate the area of the mons veneris overlying the symphysis pubis with local anaesthetic using 10-15 mls 1% lignocaine, down to and including the periosteum and perichondrium. Infiltrate especially the area approaching the clitoris as this has the richest sensory nerve supply. Use the needle to localize the softer cartilage in the midsymphysis pubis with your left index finger held vaginally to feel when the needle is almost through. Press your finger against the inside of the symphysis pushing the catheter to your left side. Leave the needle in position to allow it to be a marker for the scalpel.
• Infiltrate in preparation for a wide episiotomy.
• Cut with a scalpel (if available use a solid scalpel but otherwise use one with a disposable blade) along the needle down to the symphysis, your left index finger pressing on the inside surface as above (Fig.9).
• Hold the scalpel at right angles to the symphysis pubis with the cutting edge towards you and only as big a skin incision as is necessary for the scalpel to enter through a stab incision.
• When the point reaches the inside edge of the symphysis, cut the middle and lower fibers of the symphysis by swinging the scalpel upwards at an imaginary fulcrum at the upper edge of the symphysis. Keep exactly to the midline.
• Remove the whole scalpel, turn it round with the cutting edge away from you and repeat the procedure incising the upper and middle fibres by swinging the handle of the scalpel down around an imaginary fulcrum again at the upper edge of the symphysis. Don't go beyond the symphysis as the bladder and uterus may be protruding there.
• If the symphysis opens adequately i.e. around 1.5-2.5 cms (the breadth of your thumb) you can sometimes leave the fibres of the arcuate ligament intact but often you will need to cut these to get the gap needed.
• At delivery make a large episiotomy and use the vacuum extractor to deliver the head as far posteriorly as possible keeping the head well away from the upper part of the vagina and urethra in order to reduce the risk of damage to the base of the bladder (some recommend removal of the catheter during delivery to minimize the danger of

tearing the urethra).
• Only pull during a contraction. If necessary use an oxytocin drip to get good contractions.
• Give oxytocin as you deliver the body. After the delivery of the placenta, check cervix and vagina for tears.
• Repair the skin incision over the symphysis with one mattress suture, the episiotomy, and any tears that need repair.
• Bring the knees together, have the patient lie on one side with bed rest for 3 days. After 3 days allow the patient to be mobilized at the pace she finds comfortable, if necessary with crutches to give her support.
• Remove the catheter immediately after the procedure if there is no complication and no blood in the urine. If there is any blood in the urine leave the indwelling catheter in place (or if you removed it during delivery, replace it) for 5 days.
• Give antibiotics such as benzyl pencillin and gentamicin, 2 doses i.v., if possible one dose prior to the procedure and one 2 hours after unless there is evident intrauterine infection when this needs to be longer. Give analgesia as necessary.

Controversies over the method.

It has been said very aptly that the main barriers against symphysiotomy remain in the minds of obstetricians (A.D.H.Browne). When appropriately and correctly used this method is undoubtedly a life-saving procedure for both mother and child as Munro Kerr declared in 1948.
The massive meta-analysis by Kenneth Björklund (1) showed how good it was in terms of morbidity and mortality in comparison to Cesarean section. It has, since then, experienced a renaissance especially since the major article in the British Journal of Obstetrics and Gynaecology in 2002 with the accompanying stamp of approval by that journal's editor and the WHO and World Bank gynaecological experts.
It is high time that the method was relaunched in 3 situations in high-income-countries:
a. for severe shoulder dystocia where all the usual manoevres have failed to get progress for the delivery
b. in a stuck after-coming head in a breech delivery (this may occur even when Cesarean section is the standard option but a woman may arrive with a breech delivery so far underway that it is impossible to stop). If the head jams and all the usual efforts to disengage it from the pelvis fail, a quick symphysiotomy is life-saving.
c. Occasionally a woman with failure to progress in the delivery refuses a Cesarean delivery and demands (maybe from her background culture) a vaginal delivery. Here a symphysiotomy is a superb alternative in most cases.

When the delivering health worker is inexperienced the method takes longer but is usually quicker than a Cesarean section at this level of expertise. In experienced hands, the time from the point of making the decision until delivery is complete is less than 15 minutes. In a stuck aftercoming head this can be reduced to less than 5 minutes when local anaesthesia has already been given as a precaution during breech delivery in case of getting a stuck head.
Worry about an unstable pelvic ring after the procedure. Convalescence after a symphysiotomy takes 5-14 days but the patient should be warned against excessive

exercise or heavy lifting for 3 months to allow healing to take place. The pelvis springs back to apposition of the symphysis pubis after the baby has been born (remember that the pelvic ring has to be broken at two places to produce an unstable fracture of the pelvis). An unstable pelvis is an extreme rarity after a properly performed symphysiotomy and only occurs when the pelvis has been opened up more than 5 cms. The reason why symphysiotomy is so different to spontaneous symphysiolysis in the long term, relates to what happens to the sacro-iliac joints. In symphysiotomy the period of separation of the symphysis before the legs are brought together and the woman is laid on her side is short, provided the angle between the thighs is never greater than 80^0 Thus the risk of long-term instability of the pelvic ring does not parallel what can happen in symphysiolysis. There with separation of the symphysis for much longer periods, walking and lifting pose a risk of strain on the sacro-iliac joints.

Worry about what will happen at the next delivery after a symphysiotomy. "The real benefit of symphysiotomy is reaped in subsequent pregnancies" Feeney J.K. Each subsequent delivery is easier with the symphysis opening up a little at delivery under the influence of relaxin.

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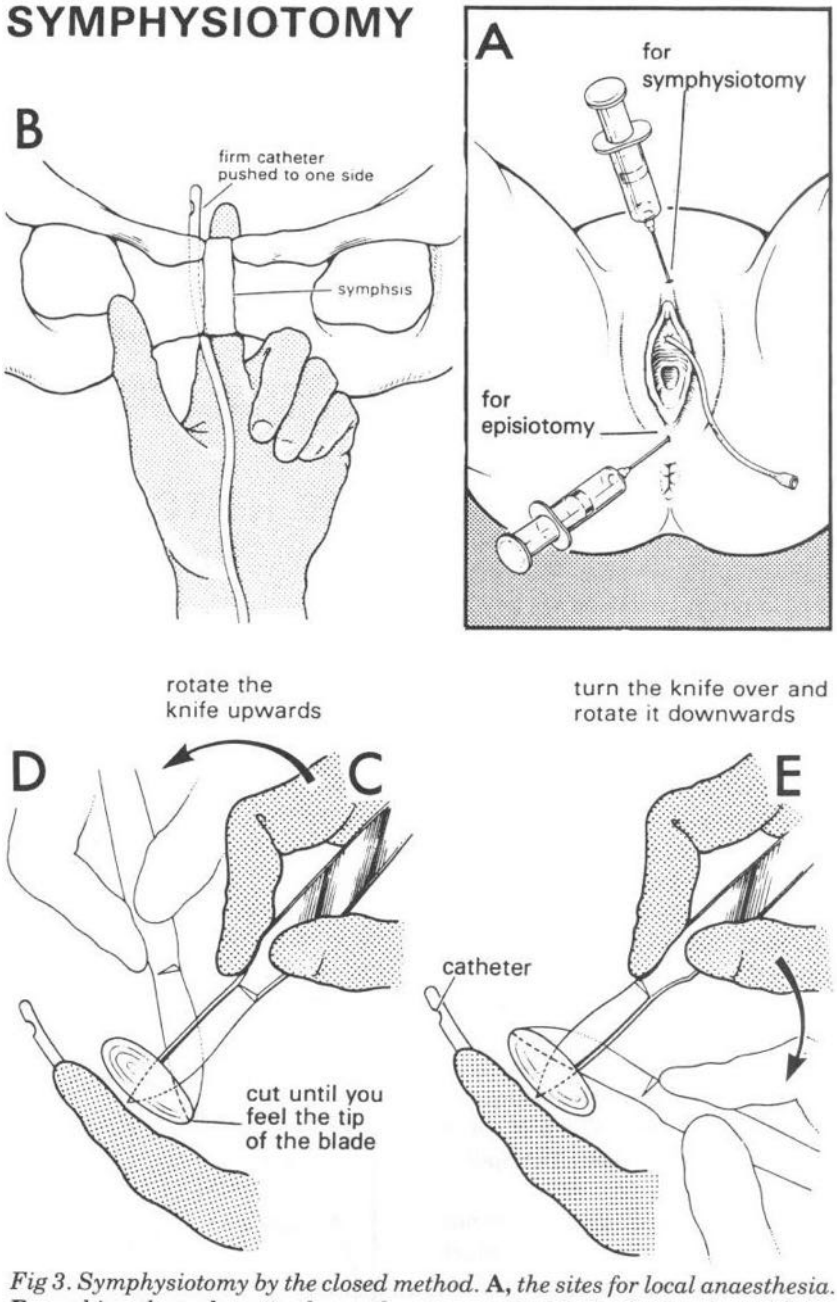


Fig 3. Symphysiotomy by the closed method. **A,** *the sites for local anaesthesia.*

Shivkar condom method for Post-Partum Haemorrhage

Use an intra-uterine inflated condom when the standard methods of stopping PPH have failed. This has been tested in large scale trials in Bangladesh, Egypt and India and called the Shivkar method after Professor Shivkar from Mumbai, India

With aseptic precautions prepare a sterile firm rubber catheter or a medium-sized Foley catheter (size 14-18) fitted with a condom where the spermicide has been washed off first with antiseptic solution. Tie the condom onto the catheter near the mouth of the condom by a silk or chromic catgut thread and then insert into the uterus. The inner end of the catheter remains within the condom about 4 cms from its tip .Connect the outer end of the catheter with a saline set and inflate the condom with 250-500 mL of running normal saline according to when bleeding stops. Observe the bleeding and when it is reduced

considerably, stop further inflation. The outer end of the catheter is folded and tied with thread. Maintain uterine contraction by oxytocin drip for at least 6 hours after the procedure. Keep the uterine condom tightly in position by a ribbon gauze pack or another inflated condom placed in the vagina. Maintain inflation of the condom catheter for 12-24 hours (up to 48 hours in extreme cases), depending upon the initial intensity of blood loss, and then deflate gradually over 10-15 minutes and remove. Bleeding usually stops within 15 minutes in more than 90% of cases of PPH. Seldom does a patient need further intervention. There is virtually no risk of intrauterine infection if preventive antibiotics are given.

On the DVD "Maternal and Women's Health" available free from
Teaching Aids at Low Cost from St Albans in England with E-mail adress:
info@talcuk.org is more details of how to deal with all the 5 big complications of delivery including Post-Partum Haemorrhage.

Six big killers in low-income-countries:

Children: pneumonia, diarrhoeal diseases, malaria
Adults: TB, HIV/AIDS, Tobacco relaterade illness
Here are some tips about good cheap and simple measures to deal with these six killers.

Pneumonia

Prevention: Vitamin A: 2 doses each year in areas with Vitamin A deficiency reduces the incidence of pneumonia considerably. Locally built stoves with a chimney to reduce the over-exposure to indoor smoke (previously shown to account for 2.2 million deaths due to pneumonia). This also reduces the amount of wood needed and the risks of burns from open fires. Many cheap easy stoves can be built locally if committed change agents are given the skills and knowledge. **See Changu Changu Moto Step-by-step guide for good example.** Better regular handwashing by children using if necessary Tippy Taps (see details below) to reduce the quantity of water needed. This reduces the incidence of pneumonia among children by more than 40%.
Diagnosis: Fast breathing is the best discriminator of pneumonia from all other acute respiratory infections. Under 2 months respiratory rate > 60/min. is significant
2-12 months > 50/min. , 12 months to 5 years >40/min. Use a pendulum to identify fast breathing especially when watches or clocks are unavailable.
Create a pendulum with a string and a weight. Make 3 marks such that the distance from the mark to the weight is 56 cms. next 36 cms and next 25 cms long. When holding the string at the top mark it will always swing 40 times/min, at the next mark 50 times a minute and then at the lowest it will swing at 60 times/min. Even in settings where neither the mother nor the village health worker can count more than 5 it is possible to find out if the child is under 2 months, 2-12 months or 12 months to 5 years. Sit or lay the child on the mother's lap and swing the pendulum at the right mark for age. If the child breathes faster than the pendulum swings, it has pneumonia and needs an antibiotic, if slower the child does not have pneumonia and should not be given any antibiotic. Use the

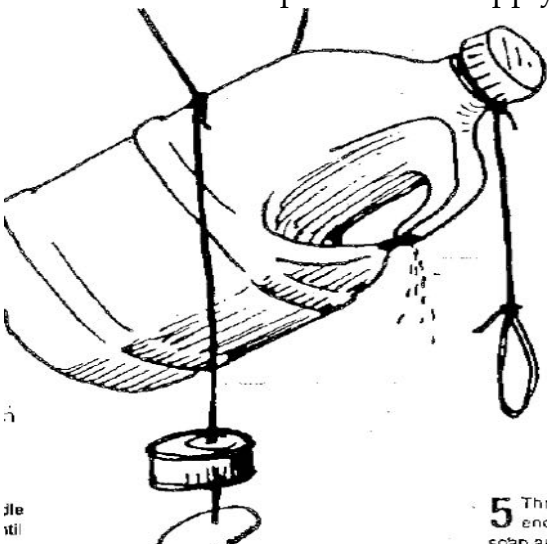
pendulum to monitor effect of treatment. In those with fast breathing check to see if there is indrawing of the lower chest wall during inspiration. If this is present the pneumonia is more serious and the child may need hospital care with i.v. antibiotics and oxygen if referral is possible.

Treatment of pneumonia: keep the options simple with three levels:

1. slow breathing therefore no antibiotics (the vast majority of acute respiratory infections):
2. fast breathing, no indrawing give oral antibiotics: cotrimoxazole or amoxicillin,
3. fast breathing and indrawing give chloramphenicol i.m. if possible otherwise orally and then refer if referral is possible for oxygen and i.v. antibiotics.

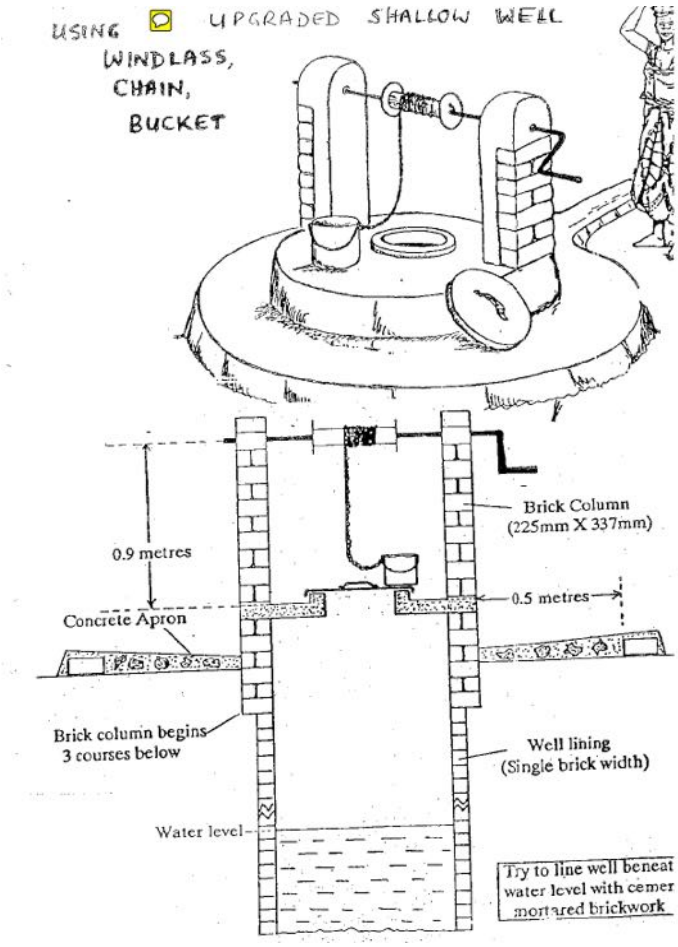
Diarrhoeal diseases

Prevention: Improve hand hygiene using a Tippy tap. Promote constructing protected shallow wells to improve water supply. Promote constructing VIP latrines: see below.



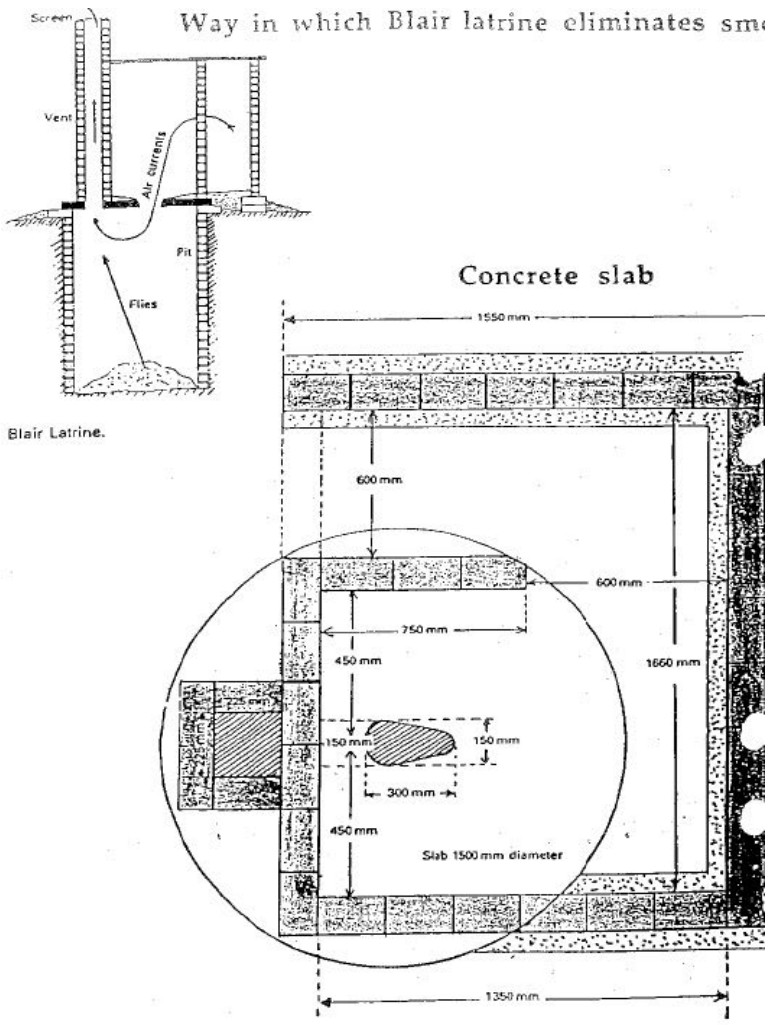
Tippy tap

The Tippy tap was developed by Dr Jim Watt at Howard Institute, Zimbabwe because of the needs of many communities with little water or long distances to get their water. A plastic jerry can with a hollow plastic handle is prepared by warming the lower end of the handle with a candle until it is soft. It is then pressed together with pliers so that any water that runs into the handle is stopped. Just above this level in the handle a small hole is made. Each time someone wants to wash his hands he pulls the string down so that about 30 mls of water runs into the handle and then slowly runs out of the hole. Using the soap under the jerry can and 30 mls of water the hands become clean enough to prevent spread of diarrhoeal and respiratory diseases. Such prepared jerry cans are hung outside every latrine and outside the kitchen and even the bed-room. Dr Watt got enthusiasts to spread the idea of washing hands after every toilet visit and before food preparation. The amount of water used is minimal. Washing the hands and face on awakening reduces the risk of spread of trachoma where there are many flies. TALC has an elegant trap from 2 PET bottles for reducing fly populations near a house - see their home page.



Protected shallow wells

Many wells in Africa risk contamination and even danger to small children falling in. Rightly constructed protected shallow wells avoid these problems and give high quality water. The windlass can be easily constructed by a skilled carpenter/blacksmith and be easily repaired when necessary. The life of such a protected well is thus much longer and more stable than many other solutions to water supply. However they need to be built in the right way and in a siting where the ground water is adequate for at least one family even at the end of the dry season. This is the time of year when the well should be dug getting well down below the upper level of ground water. The supply of water is adequate for one large family and sometimes for a whole village when the ground water is adequate. The plan for such a well came from Peter Morgan and has been widely spread in many parts of Zimbabwe and other countries.



Blair Latrine.

Dimensions of slab and structure (mm).

Ventilated Improved Pit Latrine (VIP latrine)

Promote a model of sanitation which can win the approval of the whole community where there is **no smell and no flies** as barriers to its use. The idea comes from the Blair research laboratory in Harare Zimbabwe with Peter Morgan being the main initiator of the construction. Dig the latrine hole down to at least 4 metres if possible and preferably down to 6 metres if ground water has not been reached at the end of the dry season. If the soil is sandy or unstable line this hole with burnt bricks or concrete rings. Construct a concrete slab reinforced with reinforcing iron rods or chicken wire over the hole. This needs to extend outside the hole so that the toilet building can be built on it. The slab is made with two holes in it, the one for toilet usage and the other to make a ventilation pipe or ”chimney” high enough to create an upward draft of air. All air in the toilet room is now coming in from outside and none from the latrine pit. Make the toilet room fairly dark with light coming in indirectly as shown above.Flies are attracted to light and so place a fly net well attached to the top of the ”chimney” or ventilation pipe. This must be made of aluminium or copper netting so that it can withstand the corrosive gases that come up from the latrine. Flies will fly up the chimney and bounce against the fly net hour after hour. They will die of exhaustion and fall done into the pit. If it is built properly such a latrine will be completely smell and fly proof and will last a family of 8 persons at least 30 years if the hole is at least 5 metres deep initially. If at the end of this period the pit is full

and the family want to retain the building above the ground they can dig a hole next to the original hole of the same dimensions and same depth at the end of the dry season and then punch a hole through the bottom of this second hole into the original hole. Half of the contents of the latrine will slowly empty into the new hole and then it can be filled up to the top with earth. This give the latrine 15 more years of life. When the latrine is full it can be sealed over with a layer of earth. After 1 year it can be reopened to give a supply of superb fertililizer which, after 1 year of mouldering, is completely free from any pathogens. If such usage is completely impossible because of traditional taboos, plant an avocado or mango tree into the soil covering a full pit and the size and taste of the resulting fruit will astonish all.

Solar sterilization of all drinking water with PET Bottles

Encourage all to use solar disinfection of all drinking water using PET bottles. These are filled up to 75% with water, the top is put on, shaken to oxygenate the water with the air at the top. Then the top is removed, the bottles are filled up, the top is replaced and then all the bottles are put on the roof every morning where the sun is best. Leave them all day on the roof. The UV rays sterilize the water from all bacteria, viruses and parasites that can cause diarrhoea. Put the bottles if possible on metal to give some heat (on a grass roof a piece of rusty metal is ideal). This increases the effectivity of the UV rays even though it only raises the temperature by 6-8^0 C. The bottles that were on the roof yesterday are used for drinking the water contained in them today. See further details from the home page SODIS which includes some of the many research articles about the method and its advantages.

Diagnosis in diarrhoea: keep the options simple with the following groups: Acute watery diarrhoea, persistent diarrhoea (>2 weeks), dysentery (blood in stool). These are each dealt with differently. Base assessment of dehydration on **history** of poor urine production, in severe diarrhoea, lethargy, inability to drink or breast-feed. **Examine**: look for sunken eyes, loss of skin turgor: 3 Groups: normal return after skin pinching (on abdomen), slow, but < 2 seconds = dehydration, very slow > 2 seconds = Severe dehydration; sunken fontanelle in infants up to 1 yr., dry mucous membranes.

Treatment: rehydration with the level depending on severity of dehydration., ORS, or Sugar/salt solution, staple cereal gruel for all acute watery diarrhoea except the most dehydrated who show sign of shock and will need i.v. fluids. Give all severe diarrhoea extra zinc in case they are deficient. Give all with persistent diarrhoea nutrition rehabilitation with zinc and Vit. A and often antibiotics and metronidazole or tinidazole. With blood in the stool take this as dysentery and treat with antibiotics e.g. azithromycin.

Malaria

Prevention: Encourage universal use of impregnated bednets. In settings of high density townships launch regular indoor insecticide spraying. Promote removal of all places where rain water gathers and drain any nearby marsh-lands. Use Intermittent Presumptive Treatment (**IPT)** of children under 5 and pregnant women.
Diagnosis: Use both microscopy of stained blood slides and the rapid tests that have been

distributed through the Global Fund. If these are unavailable, ask about **intermittent fever** + loss of appetite + absence of Diarrhoea & Vomiting as pointers to malaria diagnosis (this does not rule out vomiting as part of malaria presentation)..

Treatment: In areas with most malaria due to P. falciparum (most of tropical Africa) give Artemisinine Combination Therapy e.g. Coartem. only to those shown to be positive with malaria testing.

In situations that you meet the **extreme anaemia** (seen more in younger children) use an alternative to iv. blood: give the blood that is needed to save their lives intraperitoneally. This is easier to learn and teach others to use. It reduces the risk of overloading the heart causing heart failure when blood is given too quickly without strong diuretics. It has its special use in situations with an epidemic of severe malaria with dozens of children needing blood. Here are the details: Identify a point half way between the Umbilicus and the Xiphisternum. Sterilise the skin with iodine in spirit. After preparing the blood of the right blood group, connect a needle to a giving set with normal saline. Penetrate the skin only, at a right angle to the skin, and then fully open the tap to the giving set. Advance the needle slowly and as soon as the saline starts to flow (you are now into the peritoneal cavity), shut it down, connect the giving set to the blood and give the quantity of blood needed for the level of anaemia found and then withdraw the needle.

For children under 5 years who come in with coma and who are found to have malaria parasites in their blood, check if possible the retina carefully after dilating the pupil and if "ghost vessels" are seen on the retina this confirms cerebral malaria since it is never seen in any other illness. Start immediately iv. Artesunate, or if it is not available give Artemether. by im. route children 1.6 mg/kg i.m. twice a day for 3-7 days.

If a child is over 5 years and comes in with coma, first ask the parents where the child has lived over the last 5 years. If the child has lived in an area with Holoendemic or Hyperendemic Malaria then the child will already have semi-immunity to the parasite and therefore, even if malaria parasites are in the blood slide, the coma is not due to malaria. Check immediately for other causes including bacterial meningitis.

Tuberculosis

Prevention: Vitamin A where deficiency is common. In the long run try to avoid all overcrowding of sleeping areas. Better ventilation of all buildings especially bedrooms but even wards in hospitals. BCG vaccination to prevent the most severe TB of young children. When new effective TB vaccines become available, introduce these. Promote universal coverage of measles vaccination since this illness is often the catalyst that precedes the eruption of TB illness in children. Support people's movements against tobacco use and alcohol abuse.

Diagnosis: Look for acute wasting since TB stimulates the secretion of TNFα. In adults focus on all who have been coughing for more than 3 weeks. Measure their Mid-Upper-Arm-Circumference (MUAC) as a sign of wasting: < 23 cms in men, < 22 cms in women. Check their pulse which may be higher than expected with their level of fever. The essential diagnostic tool is direct staining of sputum smears for AAFB with the Ziehl-Neelsen staining method. The minimum number of bacilli that are needed to be detected by standard smear are 5000-10,000 bacilli per ml sputum. This will identify 50-70% of all "open" TB cases. Induced sputum test with inhalation of 5% saline will improve this level.

Use even the method developed where household bleach is added to the sputum and the mixture centrifuged to make identification of AAFB to be better:

The method: An equal amount of household bleach (5% NaoCl) is added to the sputum sample in a screw cap tube and the tube is shaken for 30 seconds. Then, the tube is left on the table top for 10-15 minutes at room temperature and then hand shaken for 30 seconds, every five minutes. An equal amount of distilled water is then added and the tube centrifuged at 3000 rpm for fifteen minutes. The supernatant is discarded and the pellet is suspended in a few drops of the remaining fluid. Smears are prepared from the suspended sediment.

The Sodium hypochlorite (Naocl) solution: The "Rheachem" bleach (or other make) is purchased, with the stated chlorine concentration as 5%. To prevent the reduction of the chlorine activity due to a repeated exposure to air, each 5 L bottle is decanted after it is opened into a 25ml brown glass bottle for daily use. The remaining solution which remains unused at the end of the day is discarded.

Ref. Improved Diagnosis of Pulmonary Tuberculosis using bleach Microscopy Method. Preeti B Mindolli, Manjunath P Salmani, and Prashant K Parandekar. J Clin Diagn Res. 2013 Jul; 7(7): 1336–1338.

In children the normal MUAC is around 16,5 cms, wasting shows as <13.5, and extreme wasting as <12,5 cm. Use BCG as a diagnostic method as developed by Udani in India: The accelerated BCG test. Give a normal BCG vaccination and read the resulting swelling after 4-6 days. If the swelling is more than 15 mm then the child has almost certainly active TB. If it is between 10-15 mm there is a strong suspicion of active TB. This will be positive even after measles, in malnutrition and in severe disease where Mantoux test is always negative even when active TB is present. **Any malnutrition in children 4 yrs or over is TB until proved otherwise.** In a setting with plenty of TB and plenty of malnutrition: give all PEM children nutritional resuscitation for 1 week. If no improvement investigate carefully for a hidden infection (especially urine and stool tests and careful clinical examination). If negative give a broad spectrum antibiotic (e.g. chloramphenicol + metronidazole) for 5 days. In severe malnutrition give this from the start since many of these children have an unsuspected bacteraemia. If still no improvement 3 weeks after admission give a trial of TB treatment. Use specific treatment with no other effect e.g. isoniazid + pyrazinamide. If there is clear improvement add rifampicin. With no improvement after 2 further weeks test the mother for HIV.

Several good methods of using point scales for diagnosing TB in children are worth reading up.

Treatment: Directly Observed Treatment Short-course with multi-drug therapy is the ideal. Use failure to show increased MUAC within 2 weeks of starting treatment as a very clear-cut sign of Multi-drug resistant TB (most will show increased MUAC within 1 week). Effective drugs block TNFα and MUAC goes up. If sensitivity tests are not available and MUAC is unchanged change all 4 drugs to the best alternative that is available locally.

HIV/AIDS

Health promotion and disease prevention: Here 5 research groups showed that Uganda's phenomenal success in reducing HIV incidence and prevalence was due mainly to the efforts of people's movements to change their sexual behaviour. This showed as reducing numbers of sexual partners and increasing faithfulness, less prominent but also significant

was delaying sexual debut especially in girls. The promotion of condoms had its place in groups with high-risk behaviour (such as commercial sex-workers and truck-drivers). General condom promotion outside of these groups had almost no impact (about 2% of impact through change/behaviour was shown here) All HIV/AIDS work was primarily Bottom-up through Community counselling and encouraging people's movements in dialogue with health workers. The movements themselves made all decisions about behaviour change and usually achieved consensus within a whole community.
Diagnosis: HIV testing is now widely available through the efforts of the Global Fund. If not available use as far as is possible the clinical picture, marked wasting with long-term diarrhoea often called "slim" in Africa, herpes zoster, candida in the mouth and throat in an adult, enlarged lymph nodes in the sub-occipital area..
Treatment: Through the global fund those with HIV who fulfil the criteria to need ART will be given Highly Active Anti-Retroviral Therapy (HAART). The combination will vary in various countries. There is usually a back-up alternative for those with resistant HIV or who have severe side-effects. If no virus sensitivity testing is possible, use failure to show increased MUAC within 2 weeks of starting treatment as a very clear-cut sign of Multi-drug resistant HIV (most will show increased MUAC within 1 week). Effective drugs block TNFα and MUAC goes up. If sensitivity tests are not available and MUAC is unchanged change all 3 drugs to the best alternative that is available locally.

Reduce the use of tobacco in the community

This is only possible through the efforts of people's movements promoting a consensus to change the habitual behaviour especially of young people below the age of 25 and especially below 20 yrs. If their peer groups can be persuaded to promote a smoke free generation the likelihood of their starting to smoke at a later age is very small.
This must be combined with widespread teaching through schools, the mass media, and advertizing against smoking. Films and advertizing advocating smoking should be banned. All public places of gathering should be free from all smoking. Taxation of all tobacco products should be high enough to discourage smoking. Tobacco farming should be, where possible, replaced by much more healthy crops which still give good profits.

Other simpler diagnostic hints

1. Schistosoma haematobium.: where this is endemic check urine with a urine-stick for microhaematuria. If this is present in this setting well over 95% will have S. haematobium. If negative you have almost ruled out the diagnosis.
2. LP with suspected meningitis: If there is no laboratory: Check the liquor with a urine-stick. If there are white cells, protein, and reduced glucose assume bacterial meningitis and start appropriate antibiotics.

Surgery hints in Africa

Hippocrates: "Que medicamenta non sanant, ferrum sanant". "What medicines cannot cure, the knife achieves"
Books:

Surgery Peter Bewes AMREF Box 30125, Nairobi, Kenya (Wilson Airport). Good for non-doctors and for doctors without surgical experience.
Primary Surgery: Trauma och Non-Trauma Maurice King et al Oxford Medical Publications. Invaluable for all doctors who are going to work in peripheral hospitals. N.B. can now be downloaded free from Internet. Available through TALC.
Atlas of General Surgery Dudley et al ELBS £14.00
Primary Anaesthesia. Maurice King et al Oxford Medical Publications. Invaluable for all doctors who are going to work in peripheral hospitals.
Principles and Practice of Surgery Forrest et al ELBS £8.30

Peter Bewes is a surgeon with long experience from work in Tanzania at the KCMC medical School and coordinator of a post-graduate training network for Doctors working in all the district Hospitals of Uganda. He has given some very practical tips to all working with surgical problems in Africa under severe restraints of funding. Here are 8 of his most useful tips:

1. After all accidents with open sores clean the wounds with copious amounts of water under analgesia or even anaesthesia. Running tap water is often the best at this stage especially if the wounds are dirty. An ideal setting is to have the patient on a trolley in a well lit shower linked to the emergency department with good drainage in the event of copious mud or other contaminants of the sores. If this is not available use a watering can and a large bath-tub to catch the water. At the end of cleaning only remove tissue that is obviously dead. Then if possible pack the wound with honey to prevent bacterial growth and to stimulate healing.
2. **Never, ever suture with Primary Suturing** contaminated sores even after meticulous cleaning (except for vey clean wounds on the scalp and face). Aim wherever possible for **delayed primary suturing** to avoid all the complications of infected tissue trapped within a sutured sore. **Delayed Primary Suturing** on day 3 or 4 gives just as quick healing and as little scar tissue as doing this earlier. Only suture any obviously bleeding vessels and then leave the wound open with honey until the day for suturing arrives with regular cleaning daily if needed.
3. With all bites there may well be a need to wait even further until antibiotics have cleared up all the bacteria in the wound. Daily cleaning under analgesia or anaesthesia will be needed e.g. in crocodile bites. Secondary suturing is almost always called for. Some wounds where anaerobic bacteria are often dominant are likely to benefit from packing the wound after cleaning with crushed powder from metronidazole tablets to a give local anti-anaerobic effect. It has an added effect of taking away the smell from those where the wound has reached this stage.
4. If you have difficulty getting hold of suturing material, and if its cost is prohibitive, use fishing nylon instead. For most surgical needs, two sizes of nylon are enough: a reel with 6 pounds breaking strain and another with 12 pounds breaking strain. Suitable lengths of these are then sterilised and available for suturing. You can even learn from Peter Bewes book: Surgery (AMREF), how to make atraumatic sutures for finer work.
5. In nearly all abdominal surgical operations never suture the peritoneum (it heals better and quicker by itself with the coelomic cells reconstructing a smooth peritoneum with less risk of adhesions). Suture if possible all layers (with nylon) including the skin at

closure of such operations.

6. For virtually all fractures of limbs use if possible Perkins methods of treatment which virtually removes the risk of delayed union or non-union of the fracture. Practically all of these methods have very early training of the muscles around the fracture and deliberately avoid fixation of the bone. They also avoid the risk of infections after fixation methods with screws, plates and rods.
7. Always use the Lord's method of operating on hydrocoeles. This is quicker, gives less bleeding afterwards but needs good anaesthesia see method below pp.37/38
8. Learn the use of ordinary mosquito netting of the right quality and cleaned in the right way to strengthen the repair of most inguinal hernias. See Pär Nordin et al.

The whole world of medicine including surgery has been transformed with the advent of HIV/AIDS.

1. Many surgical conditions have appeared that are directly linked to HIV/AIDS e.g. aggressive fascitis TB in various unusual places e.g. vulva, and more commonly in known places e.g. pericardium, breast, abdomen, veterbrae, large joints etc.
2. HIV can make the healing process slower after all surgical procedures.
3. HIV can make staff at operation more at risk of stick accidents with the need for anti-retroviral treatment thereafter. However this risk is extremely small.
4. Blood transfusions can never be as common as before since even with good tested blood there is a small risk of infected blood having been donated in the "window period" and thus negative on HIV testing.
5. HIV/AIDS can affect surgical staff who may have to be away from work because of illness.

Surgical Priorities

The most important operations at a district hospital level are:

Planned operations: Hernias, hydrocoele, skin transplants, operations for entropion of eyelids due to trachoma, amputations and sterilization operations. Those more surgically skilled will add hysterectomy, cataract operations, prostate operations, various abdominal operations.

Acute surgery: trauma after traffic accidents, tractor accidents, falls from trees etc. burns. In trauma cases use frequently washing with ordinary tap water in large quantities. Use a hose or a watering can for larger wounds. This will need analgesia see below.

Surgery related to infections: draining of abscesses, debridement of bites such as crocodile, lion and snake bites and even human bites etc.

Obs and Gynae: Evacuation of uterus after incomplete abortions. Cesarean section and symphysiotomy. Laparotomy at extra-uterine pregnancies

Abdominal operations for: " sigmoid volvulus, small bowel volvulus, ileosigmoid knotting, perforated peptic ulcer" now slowly increasing incidence of appendicitis which was previously unknown in rural people on a traditional high fibre diet.

A rule that I was taught by a very experienced rural doctor was: you should probably not be doing Cesarean sections if you are not doing at least a moderate amount of other surgery as your theatre staff will not be skilled enough to give safe assistance and

preparation or have the routines of giving good post-operative care. Likewise your own skills may be ”rusty.”

Burns

During the first days after a large burn the greatest threat is from shock from fluid loss depending on the body surface area burnt. Most burns under 20% body surface area burnt will survive whatever you do unless vital organs are damaged. Most patients over 70% surface area burnt will die whatever you do. Thus the ones who will survive depending on good medical care are those between 20-70%. The amount of fluid that needs to be given as replacement for fluid lost can be worked out using the “rule of nines” for adults and “rule of sevens” for children. The patient’s hand area is about 1% of body surface area. The amount of fluid lost is reduced when amnion cover is used for the burn.

	Adult	**Child**
Head in total	9%	28%
Each arm in total	9%	7%
Each leg in total	18%	14%
Trunk (front)	18%	14%
Trunk (back)	18%	18%
Perineum	1%	2%

The replacement fluid required, extra to normal daily bodily requirements (100ml/kg), is given according to the formula: the number of mls during the first 8 hours, the next 16 hours and the following 24 hours is % area burnt x body weight in kg. If a patient arrives for treatment 1 day after the burn the fluid can be spread out equally over the day. Measure urinary output which should be at least 1 ml/kg body weight per hour.

Another way to work out fluid requirements: % body surface area burnt x body weight in kg x 3 is the volume in ml extra fluid over the first day with half being given in the first 8 hours and 1/4 each under the following two 8 hour periods. Example a patient with 30% body surface area burnt who weighs 10 kg needs 900 ml over the first 24 hours extra to normal body requirements i.e. 900 ml + 1000 ml.

Give this fluid orally in adults with a body surface area burnt less than 15% and in children less than 10% also orally. Above this level give it all intravenously. Give all the fluid as Ringer’s lactate during the first 8 hours and then if possible over the next 16 hours give half as blood and half as Ringer’s lactate.
As soon as the patient can eat and drink give high calorie/high protein food with extra vitamins.
During the first 10 days give benzyl penicillin and tetanus toxoid. The biggest risk in this period is from Streptococci.
Then gram negative organisms take over colonization and you need to give broader antibiotics when there is any sign of infection and look out for any signs of pseudomonas or proteus unless you are able to expose the burns daily to sunshine for around 20 minutes per day. Once these organisms have established themselves you may need treatment with gentamicin or a cephalosporin such as ceftazidime (Fortum) or in less aggressive invasion

with ciprofloxacin.
Give good analgesia with morphine or lignocaine (see below).
Use splints to try to avoid contractures.
For major burns of the hands nurse the hand completely enclosed in a plastic bag without bandage and encourage active movements of the fingers from an early stage.

Sometimes a patient appears with an old burn that has developed a thick leatherlike eschar over the burn site. This needs to be removed and the area underneath which is usually infected needs to be cleaned up before a skin transplant can be considered. The traditional way of peeling off this thick leathery covering is by surgery and it usually bleeds profusely at the time of the operation. A very elegant alternative that usually works is to slice a loaf of white bread and cover the eschar with the slices of bread and then bandage these down to the eschar and leave this for a couple of days. The bread sucks the eschar up to itself such that it slowly is separated from the underlying tissue and when the bandage is removed the whole eschar usually comes away from the site with the bandage. There is usually very little bleeding and then honey, as described below, can be used to clean up the wound prior to transplant.

For local treatment of burns:

1. Open exposure method of the burns under impregnated mosquito nets. This is especially good for partial thickness burns but can also be used for full thickness burns.

2. Saline method where you mix 0.5% saline solution with water (half a teaspoon in a litre of water and keep moistening the bandages every 2 hours day and night. Change the bandages once a day after a saline bath during the time that the burns are very infected. You can give Ketalar 1mg/kg i.v. for bigger burns when changing the bandages or pethidine/valium or i.v. lignocaine 1 mg/kg as the first dose and then 40 μgm/kg/min during cleaning of the burn (2 gms in 500 ml normal saline given i.v. slowly).

3. Amnion method. If you are able to test all delivering women for HIV, hepatitis B and syphilis and can reap the amnion from the placenta after each delivery that is test negative you can build up a supply of amnion in a refrigerator which can be used for all fresh clean burns to cover the whole burnt area. If this is partial thickness including deep partial thickness and keeps clean you will get full healing underneath the protective cover of the amnion membrane which breathes but lets out almost no serum. If it is a full thickness burn you will need to change it after about 4-5 days until granulation tissue is ready for transplantation.
The method of reaping the amnion is as follows:
Deliver the placenta with the attached membranes in a sterile manner. Peel the amnion off the chorion layer. Wash the amnion in sterile saline. Wash it in dilute chlorhexidine solution to disinfect from bacteria. Wash it in 2.5% povidone iodine solution to disinfect from any viruses present and any bacteria not sensitive to chlorhexidine. Store in normal saline with 100mg gentamicin in the fridge for up to 6 months.

4. Honey - vegetable oil method. This was well described in an article in the British

Journal of Surgery from India. Mix 9 parts honey with 1 part vegetable oil and cover the burn with a thin layer and then a bandage over the layer. Change the bandages depending on whether the burn is infected or not. Nurse them under a mosquito net as bees will otherwise be attracted. Honey has 4 advantages over other dressing agents: it has strong anti-bacterial properties; it stimulates healing mobilizing the cell structures around the burn that initiate healing; it ensures less scar tissue after healing and less risk of keloids (major risk in Africans); the scar tissue that is formed is mechanically more stable. Much of the initial research on the use of Honey in burns and other sores was carried out at the Institute for Honey Research in New Zealand there using their Manuka Honey. Experience in India, Tanzania, Zambia and many other places shows the same advantages using their local Honey.

Skin transplantation

At the time of skin transplantation of bigger areas use the harvested skin to stop the bleeding from each donor area. As the skin is harvested replace it exactly from where you removed it and almost immediately the bleeding stops. When all the skin has been harvested and the bleeding has stopped, gently peel each donor piece of skin off to position it over the clean burn site in the same sequence as it was harvested.
Prior to the operation expose the burnt and donor skin to direct sunshine under a mosquito net for 10 minutes and repeat this after all the transplanted skin has been placed over the burnt area so that the skin will stick and any surface bacteria will be destroyed by the UV light from the sun.

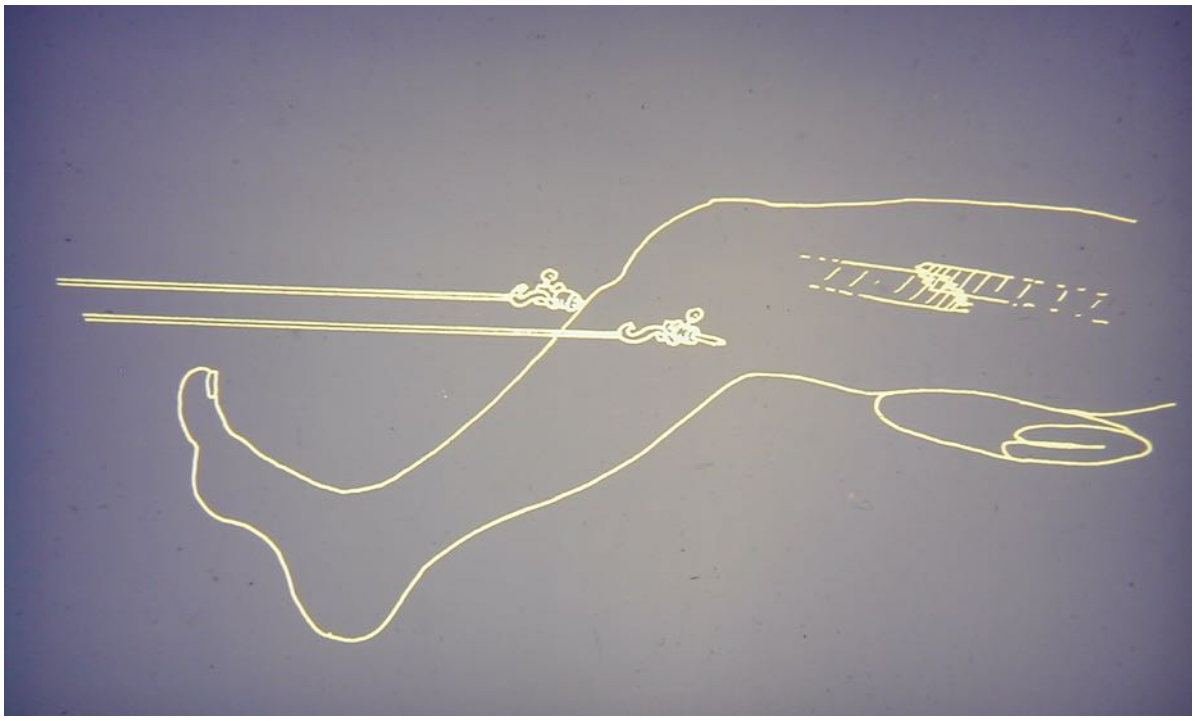
Hydrocoele

One of the commonest operations needed in most hospitals in Africa is dealing with large hydrocoeles. A very simple and elegant way of operating on these is using the **Lord's operation**. This is the easiest and quickest to perform and causes the least amount of bleeding. Choose an area opposite to the attachment of the testis. Find an area with the least number of blood vessels. Cut down to the hydrocoele sac in an opening just big enough to bring the testis through this hole. Pushing the testis from behind, bring the testis through the hole you have made. Pull up the testis. "Gather" the tissue that surrounds the hydrocoele sac with radial intermittent stitches just as curtaining material can be "gathered." Carefully avoid blood veesels as you do this. When you have a radial series of stitches right around the testis and its attachment, carefully ease the testis back through the hole and then stitch the incision with a continuous stitch. You will need to learn how much the gathering stitches can pull together the tissues around the hydrocoele bag such that it is still possible to ease back the testis without too much force. This operation needs good anaesthesia and a well placed caudal anaesthetic is ideal.The deep pain when handling the testis may need a small dose of morphine or pethidine i.v. if the patient finds this manipulation of the testis uncomfortable. In some of the biggest hydrocoeles there is a small risk of reappearance of the swelling after the procedure. If this happens the Lord's operation can be repeated at a later date.

Orthopaedics when resources are scarce: Perkins methods (Bewes) see the accompanying illustrations

One of the trickiest problems facing Africa is that of trauma. Injuries are very common – both as a result of war and of the impact of cars and lorries and falls from trees. Fractures are frequently seen. But much of the equipment that seems nowadays to be required is expensive and difficult to use. I was lucky. I was trained by the late Professor George Perkins who believed in simple methods of doing things.

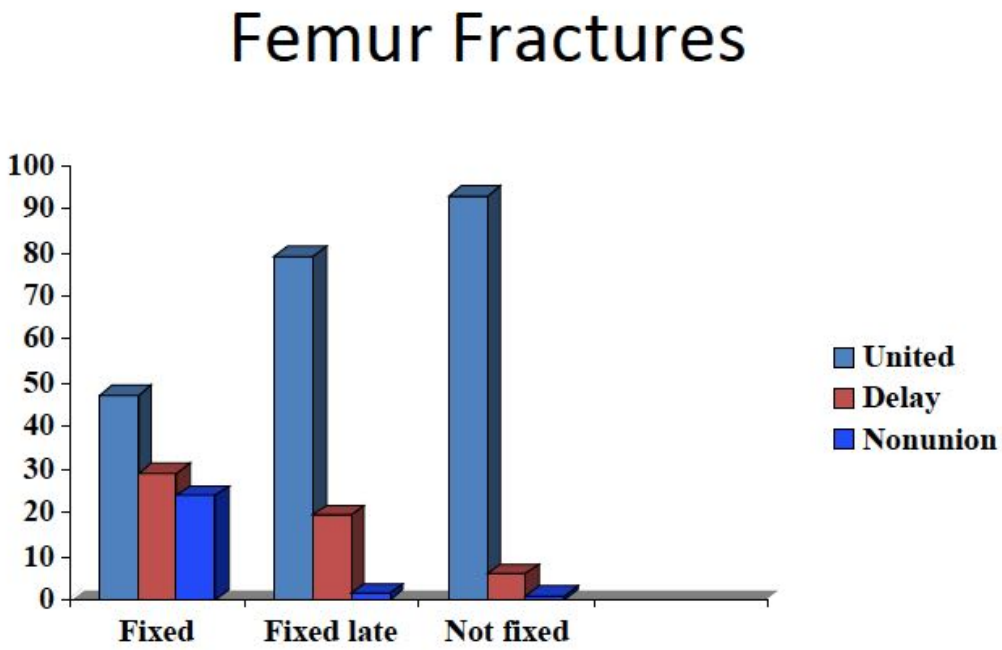
What did he do for a **fracture of the femur?** He didn't believe in the use of the Thomas splint and complicated arrangements of slings and pulleys all round. Instead he taught that if you applied traction using a Denham nail or a Steinmann pin through the upper tibia (Fig. **1)** (Fig. **2)** and nursed the patient over a split bed (Fig. **2)** and allowed the patient to do active exercises (300/day!) day after day, the bone would unite quickly and straight and allow excellent movement at the knee joint. This method is now widely used in East Africa, and was used by the professor of surgery in Lusaka, Zambia, to successfully treat his own son after a gunshot injury shattering the femur. I compared Perkins Traction as done in the Birmingham Accident Hospital with operative treatment as done in the same hospital before I got there from Africa (Fig. **7)** The orange columns show those who united, the red columns those who failed to unite, and the blue columns those who took an overlong time to unite.



Details step by step

1. Position a folded towel under the fracture site to maintain proper bowing of the femur
2. The correct traction weight is one-seventh of the body weight (10kg for 70kg person
3. Measurement of the length will tell whether the correct amount of traction has been applied
4. Measure from anterior superior iliac spine to the ankle (to be the same length as other leg)
5.

6. Start the exercises from the 3rd day after the fracture with knee bending and straightening in the "well" of the bed. Do this several times a day. For the first few days these exercises may only last a few minutes but later they can be done for several hours. If possible get the patient in the next bed to count the exercises to come up to 300/day. When the callus makes the fracture firm reduce the traction to 1/10th of the patients weight and continue the exercises The fracture is united when there is no longer any tenderness at the fracture site, the bone cannot be bent, the patient can lift the whole leg straight up off the bed even when with the weights still on.



7. Remember to get the patient to also exercise the good leg as well to maintain good tone in the thigh muscles.

It proved the same with **tibia fractures** (Fig. **8)**. The American surgeons Dehne and Brown independently showed that early weight bearing in plaster gave excellent results. So we tried this in Africa and later in the Birmingham Accident Hospital. Some really nasty open fractures needed a few days provisional traction through the heel bone, and skin grafting before they were safe to put in plaster (Fig. **9)** and in Africa we didn't have those nifty rubber walking heels, so we made heels out of bits of wood and motor car rubber (Fig. **10,11)** and so got them walking and bearing weight ~ but success was achieved as in the case I showed to begin with, here he is (Fig. **12)**. The results with the tibia fractures were almost as dramatic as with femur fractures (Fig. **13)**. For walking in wet weather, we used bags made of strong thick plastic**)**, to prevent the plaster going soggy.

Details step by step

1. Patients with open fractures often have shock and need treatment for this with iv fluids.

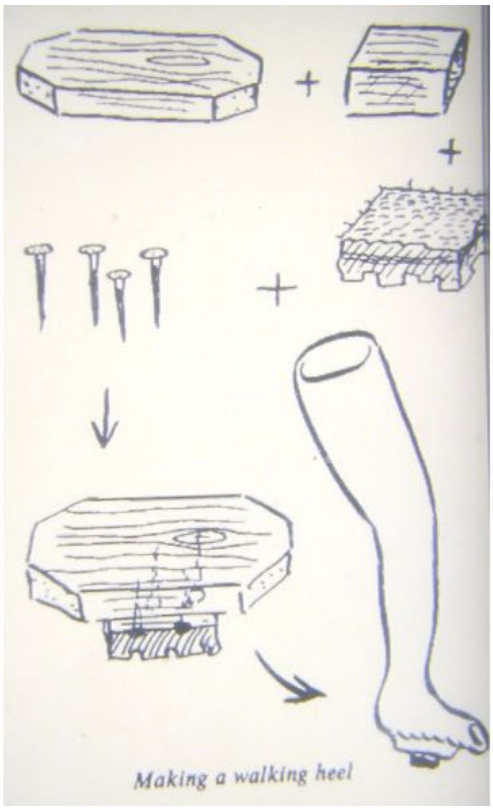
2. The Diagnosis is usually obvious and they need pain relief not least during transport. Give morphine after setting up a drip.

3. The best splint is usually a cushion or a pillow splint or a padded banana-stem splint or bandage after padding to the other leg.

4. Compound fractures need first aid-treatment: Stop external bleeding. Full surgical toilet with good analgesia using copious tap water to wash away dirt etc.. After cleaning fill the wound with honey if this is available to destroy any bacteria and stimulate healing. This can be changed daily if needed. Cover with bandage.

5. Raise the foot of the bed and if there is significant swelling apply traction with a Steinman pin through the os calsis. When the wound is clean and beginning to show signs of healing, skin graft it. When most of the graft has taken put the leg into well padded plaster of paris (POP) from the mid-thigh to the toes with the knee bent at 10 degrees and the ankle at 90 degrees. Even with padding if there is any risk of swelling, split the whole plaster from end to end right down to where the skin can be seen, with the end of the bed elevated. Check the circulation in the foot every few hours and if necessary spread the plaster apart. When the danger of swelling is over, complete the plaster and put on a walking device. This can be made locally with two pieces of wood and a small square of car tyre rubber. Glue and nail them using 4 nails. Make half of a 3-inch roll of POP into a wet lump of plaster. Put this between the walking piece and the sole of the plaster. Then strap the walking piece firmly to the POP using more POP.

6. Now encourage the patient to walking with crutches as soon as possible. Do not remove the POP until the patient can walk in it without crutches. This walking acts as a good stimulus to callus formation and is essential for good healing. If necessary in the rainy season protect with POP with a strong plastic bag. When the POP gets loose change it. When there is no tenderness over the fracture site or movement of the bone take the POP off and encourage the patient to walk without a limp. Avoid games or strenuous work for a further 8 weeks.



Humerus fractures were fun. I had worked in England with a surgeon who said they were very difficult. So difficult that he wrapped the whole of the upper body in what he called a "Cuirasse" of plaster of Paris enclosing the chest and the arm and still he got problems. George Perkins went to the opposite extreme. He used only a half-arm sling that just supported the outer one half of the forearm and no splint at all (Fig. **14)**. Just early active movements. And pendulum movements to prevent shoulder stiffness (Fig. **15)**. Mind you, it was a bit painful the first few days upright in a comfortable chair. A nurse – Pat Gilmer – suggested using banana stems as temporary disposable splints and these were very comfortable (Fig. **16,17)** ~much better than Kramer wire Splints .

Details step by step

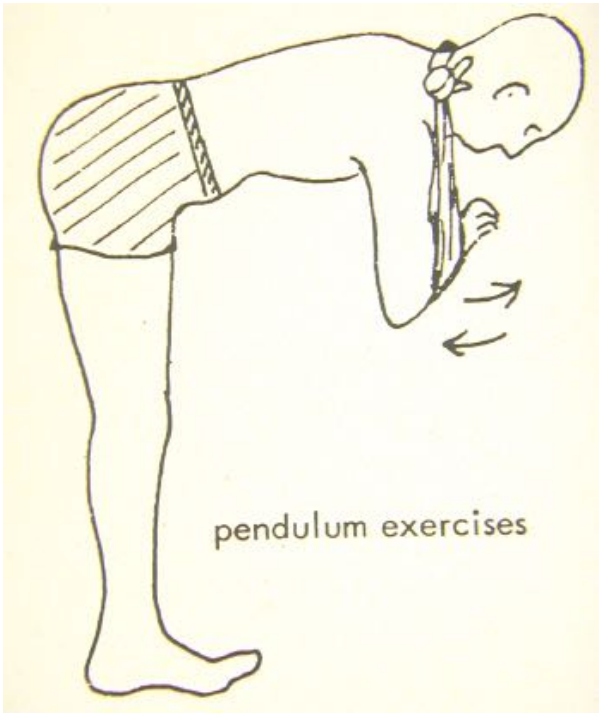
1. Pain relief with morphine of pethidine is kind. As soon as the patient can sit up encourage this, and put the upper limb into a special sling This **does not support the elbow. It only supports the distal half of the forearm** and the upper limb is allowed to hang naturally at 90 degrees. Make the sling from a triangular bandage rolled over and folded several times until it is 10 cms wide. With the patient sitting or standing with the sling in place the force of gravity pulls the fracture out to shape, reducing the deformity and within a day or two **the patient can start active exercises**. For the first

day or two a padded banana-tree splint can be applied to the arm isf the pain is severe. This is lightly bandaged to the arm.

Here is a private patient of mine (a nurse) who did very well with this treatment (Fig. **18**). I have only known one patient in whom Perkins' sling and exercises failed to produce union.

2. There are two exercises needed, one is of the elbow inside the sling being moved up and down many times within the sling and never going beyond 90 degrees. The other is a pendulum exercise of the shoulder with the patient bending over almost to 90 degrees and then swinging the whole arm away from the body and then towards the body like a pendulum. The sling must stay put during all exercises.

3. These exercises are carried out for at least 8 weeks. A large callus will develop and after about a month the patient can lift the arm above the head. If the fracture is transverse it may take 3 months before adequate healing has occurred but if it is a spiral fracture full healing takes around 8 weeks.



For other fractures using the Perkins methods of active movement without fixation of fractures see **Peter Bewes: Surgery A manual for rural health workers**

No, for fractures, I think I can agree with Gaythorne Girdlestone from Oxford who said "A bone is like a plant with its roots in the soft tissues, and when its vascular connections are damaged it needs not the skills of a cabinet maker but the care and attention of a gardener"(Fig. **19**). And Professor Jellis from Zambia wrote this:- **"Non-operative methods are not just better for the Third World ~ sometimes they are simply better"**.

Antiseptics, Wound cleaning and Disinfectants

Most dirty or contaminated or infected wounds will benefit greatly from washing with ordinary tap water in large quantities. Use a hose or a watering can for larger wounds e.g. road traffic accidents, human and animal bites. This washing with water is irritant to the tissues and so for larger wounds you will need good analgesia or anaesthesia. If you are able to see which tissues are definitely non-viable remove these surgically. Do not suture such wounds ever even if they look fairly clean. **Delayed primary suturing on day 3** or up to day 7 is much better. After cleaning, cover with a clean dry loose dressing and remove this at day 3 unless the bite or wound is severely contaminated e.g. a crocodile bite when it will need daily cleaning under anaesthesia.
Use the disinfectant effect of the UV rays of sunshine on large open wounds. After cleaning and surgical debridement expose the wound to direct sunshine for about 10-15 minutes while under a mosquito net to keep flies away.

Crisis situations

If you are out in a village and try to help someone with contaminated wounds on a large scale and there is little chance to bring the person to hospital clean it with as clean water as you can get available and remove all dead tissue. Then pack the wound with honey and cover it all with whatever you can use as bandage and then ask the local village Health worker to open it up after 5 days and repeat the process again, packing with honey and then covering it all. This is somewhat similar to what was discovered in the Spanish Civil War of the 30's when there were no drugs or disinfectants available and the wound was allowed to "stew in its own juices."

There are three groups of disinfectants

Group 1: chlorhexidine (Hibitane, Savlon), cetrimide (Cetavlon, Savlon) and phenolics (Dettol). N.B. Savlon is a mixture of chlorhexidine and cetrimide.
These do not kill HIV and Hepatitis B. They are good at killing many bacteria but not TB.

Group 2
These kill HIV and Hepatitis B.
a. Chlorine-releasing compounds e.g. sodium hypochlorite (bleach, eau de javel), chloramine, sodium dichloroisocyanurate, calcium hypochlorite.

b. Iodine-releasing compounds: povidone iodine (Betadine, weak iodine), tincture of iodine is a combination of iodine and spirit. It is irritant to mucous membranes and sores. Povidone iodine: Good for killing viruses including HIV but in all tissues where spirit is contraindicated e.g. the eyes or open wounds use a diluted acqueous solution e.g. for eyes 2.5%.
For wounds and burns use 2.5% solution in water; for skin disinfectant use 10% solution in spirit.

Group 3
c. Alcohols: isopropyl alcohol, methylated spirits, ethyl alcohol. The latter two are most effective at a concentration of 70% mixed with water and are less effective as disinfectants at 100% concentration Thus they should be mixed as 70% alcohol with 30% of boiled water or solar sterilized water when used as disinfectants.

d. Aldehydes: formaldehyde (Formalin), glutaraldehyde (Cidex)

e. Miscellaneous: Virkon excellent for viruses including HIV, hydrogen peroxide

Clearing Blood stains from clothes, uniforms and operation cloths. Use cold water without sopa or detergents and rub away the stain with a scabbing brush or a clean cloth to remove the stain. If clothing is badly covered with stains after a bloody operation at night dump the clothes in a big bucket of cold water and let them lie there until the next morning when the stains can be rubbed away with new clear cold water.

Sunshine as an ally in Medicine

All life on earth is dependent on the warmth and energy coming from the sun. In the tropics especially at times of excessive heat the sun is often seen as an enemy when it worsens drought, drains people's energy, and can cause specific health problems such as dehydration, sunstroke and hyperthermia.
It is amazing that so little attention has been paid to modifying buildings according to the prevailing sun. Thus in a hot country in the tropics all buildings should have their windows facing North and South and none facing East and West. If possible the walls facing East and West should have the most heat insulating material available or have a double wall with an air-space. South of the equator with the winter sun (in countries with a cold winter) coming from the North then the North side windows should be large and low down with a small overhang to allow in as much of the winter sun as possible. In the same setting the summer sun would come from the South and so the South facing windows should be small and high up with a large overhang. There should be good through ventilation between ceiling and outer roof which could be blocked off for the cold winters.

There are situations in medical practice in low-income-countries when the sun can be used as an ally in improving health.

1. Solar heating for water

This simple relatively cheap technology should be a standard part of all buildings in the tropics and sub-tropics where hot water is needed for patients in wards, or staff houses.

2. Solar panels for production of electricity

This is much more expensive using sophisticated technology in contrast to the above. It can be used for lighting, running refrigerators for vaccine storage, and even water pumps. It has been shown that for remote health units without any other source of electricity the initial outlay pays for itself in running refrigerators for vaccine storage within a few years. This is when comparing it to using a paraffin (kerosene) fridge. The paraffin fridge needs more attention and maintenance. Unless looked after by someone of a pedantic nature it is likely to have wide fluctuations in temperature which could affect the viability of vaccines stored in it.

Most solar units have a 20-year lifespan and the only renewable part within that time are the current storage batteries which in the tropics have a 3-5 year lifespan. This can be increased if the batteries are protected from temperature fluctuations by placing them underground in a cellar or a similar setting. However in the future newer forms of battery can have a much longer life-span

Many NGO health units have found that donors are much more likely to give for capital investments than for running costs which also makes solar electricity more interesting.

3. Using sunshine to sterilize drinking water

Much of the advice from health workers to families affected by diarrhoeal diseases about boiling drinking water goes unheeded because of the effort of fetching firewood for what is seen as an unnecessary measure. Many good studies have shown that sunshine is an alternative that can be used to sterilize water.

Get hold of a clear PET plastic bottle that is not too bulky (up to 2 litre size is ideal). Fill this three quarters full with water and screw on the top. Shake it up thoroughly. Then fill to the top. Expose this for at least 4 hours and preferably the whole day in direct sunshine on a black background such as a black stone or on a piece of galvanized roof sheet. The UV radiation from the sun is made more effective in killing the diarrhoea-producing organisms.by oxygenation with the shaking and by raising the temperature somewhat with black paint on the back of the bottle or placing it on a metal base. After cooling it can be drunk with complete safety from the point of view of organisms. Ideally have two sets of bottles one set which is out all day and the other has cooled overnight and is used for drinking. Of course this does not remove chemical contamination.

NB it is not primarily the heat but the UV irradiation in combination with heat and oxygen that kills. A glass bottle which stops much of the UV rays is less effective. Plastics other than PET are incorrect as they are not chemically stable in sunshine.

4. Sunshine as a disinfectant for infected sores.

Many severely infected sores can be improved if after surgical cleaning the sore is exposed to direct sunshine for 10-20 minutes a day. Obviously the wound must be protected from flies during this period e.g using a mosquito net over the bed. The sterilizing effect of the sun only works at the superficial layer and so it may need repeating after each surgical cleaning. Certain bacteria are especially difficult to get rid of with antibiotics e.g. Pseudomonas and Proteus; these are extremely vulnerable to sunshine

5. Sunshine for use in burns

A special situation where the disinfectant property of sunshine is useful is in extensive burns.

Bath the patient in a bath of warm water and salt (at body temperature and with enough salt to make it close to 0.9% saline) with a non-irritant antiseptic. Expose the patient to direct sunshine under a mosquito net for 10 minutes. Protect the patient from prying eyes and from cold wind especially in the winter. The sunshine is particularly valuable for killing the gram negative organisms such as pseudomonas and proteus which are the main threat to life after the first 7 days (in the first week Streptococcus is the main infective killer)

This can be used just prior to skin grafting. After a bath as above put the patient with the burn exposed for 20 minutes in the sun. Take the patient to theatre. Carry out the skin graft. If grafting is all on the same side of the body return the patient to the sun for a further 10 minutes to get the graft to stick on before bandaging it into place.

6. Neonatal jaundice

At a rural hospital or rural health centre level without electricity neonatal jaundice that is rising rapidly and early is best dealt with by exposing the naked child to indirect and short periods of direct sunshine. Bilirubin is broken down by the sunlight to water-soluble isomers which are excreted by the kidneys and are safe for the brain. Thus in warm dry weather the naked child can be nursed in the shade of a tree provided it is sheltered from chilling wind, and short periods of direct exposure to sunshine watching carefully for overheating. This is easier in the morning sun. The mother must give frequent breast-feeds to maintain adequate glucose levels and good hydration. In cold or wet weather nurse the child in a warm room next to a large uncurtained window and, if possible even there, to some periods of sunshine.

Pain relief in terminal cancer patients

In many settings with very limited resources palliative care is difficult even where morphine is available. The depot preparations are virtually never available. One method we found was especially valuable in patients with the very aggressive cancer of the bladder caused by schistosomiasis. These were virtually never suitable for surgery and their pain was difficult to palliate even with morphine. We used a method which has been used in other countries namely **Intrathecal hypertonic saline.** 20 mls of 7,5% saline is given under general anaesthesia with a Ketalar drip as described below. This saline solution is extremely irritating for all tissues including the nerve system in the spinal cord hence the need for general anaesthesia.

Details of method: Carry out a lumbar puncture through L3/L4 and allow 20 mls of CSF to flow out. Slowly inject the hypertonic saline. You will find that all the toes go into extreme extension as the irritant effect takes place and the BP will rise. Remove the needle. When the patient wakes up there will be a couple of days when walking is difficult but then the motor neurones come back into full action. The pain fibres are almost knocked out for about 3 months and this gives enormously effective pain relief. Not all pain is gone, thus there will not be the risks of total loss of pain sensation. There is no effect on the sphincter mechanisms nor on normal touch sensation. If the patient survives longer than 3

months the same procedure can be repeated. Many patients who have hardly slept for weeks or even months because of pain can go home on paracetamol or other simple analgesics. If you cannot get a supply of 7.5% saline make your own: boil to dryness 167 mls of normal saline. Add 20 mls of water for injection to the powder and then use this to inject intrathecally as above.

Acute lumbago (ryggskott)

Another useful treatment is for patients with acute lumbago such that they are totally immobilized by pain. Give the following mixture through the same sacral hiatus as is used in caudal anaesthesia - see below (this goes into the epidural space from below). Inject a mixture in the **same syringe** of **20 mls normal saline** with **100 mg hydrocortisone acetate (or Depo-medrol 40mg.) + 4 ml 1% lignocaine** when you have shown that you are in the epidural space. In 75% of those with lumbago such that they are totally immobilzed this will be virtually curative and they can usually get up and become mobile again almost immediately. In the remaining 25% there will be immediate relief but then they will still have pain afterwards when the lignocaine effect has worn off. It is postulated that the injection is so effective because it is a combination of the anti-inflammatory effect of hydrocortisone, the anaesthetic effect of the lignocaine and the volume effect of the saline. The total volume injected may be around 26 mls.

Anaesthesia when resources are scarce

Use Pethidine 100mg i.v. mixed in the same syringe with Diazepam 10 mg for evacuation of the uterus after an incomplete miscarriage. Give slowly and follow the BP especially if the patient is anaemic or close to being in shock from blood loss. Such a patient will need a much smaller dose. You can use the same dose for most adults when incising and draining large abscesses but be careful in older patients and those whose general state is poor as their dose will need to be reduced. In all cases it is wise to give half the dose and wait to see the effect on BP. If neccessary when more analgesia is needed you can give Ketalar 1mg/kg i.v.

Ketalar can be used without pethidine/diazepam in a dose of 2mg/kg i.v. which gives 5 minutes general anaesthesia for very short procedures. It is especially useful when children come with a foreign object in their ears or noses when maybe several in the village have tried to remove this and the children are frightened and stressed. In most children Kaetalar can be given without any premed if they are allowed to wake up in quiet calm surroundings. In adults give premedication with promethazine e.g. 25-50 mg orally before the Ketalar or 25 mg. i.v. just before the Ketalar. This is a better premed than diazepam which is an alternative and can be given orally as 5 mg. 1 hour before the procedure.
For longer operations use a Ketalar drip with 10 ml of Ketalar 50mg/ml in 500 ml of 5% Dextrose or 0,9% saline after premedication with promethazine or diazepam as described above. Begin with 140 drops a minute for an adult.
Remember that the patient is asleep but has his/her eyes open and staring vacantly into space if the dosage is enough to stop any pain sensation. He/she will retain cough and blink sensation reflexes when the anaesthetic is working. As soon as the patient is

anaesthetized adequately to start operating reduce the drop rate to around 60 drops a minute but if there is pain sensation showing by the patients movements increase the rate again. Often the BP will rise under Ketalar.
It is extremely important to let the patient wake up in quiet, calm surroundings which will reduce the risk of hallucinations at this phase. However in the few cases when this occurs reassure any relatives who are sitting next to the patient that this disappears after a while and just to take things calmly and wait.

Caudal anaesthesia

This is very good for operations in the lower abdomen and perineum. Use 20 mls of 1.5% lignocaine with adrenaline or 0.5% bupivicaine if this is available. Have the patient on their abdomen with a pillow under the lower abdomen while preparing for, and giving the caudal. Press with your index finger over the lowest part of the coccyx and work your way upwards pressing firmly against the coccyx until you reach the sacrum. Keep moving upwards until you feel a soft area with a bony arch above this soft area. Inject lignocaine 1% into the skin and subcutaneous tissue and wait for this to give full analgesia. Now advance an angled needle attached to a syringe with saline towards the bony arch but remaining in the soft area below until you feel it give as it goes through a membrane at the sacral hiatus. Test with the saline in the syringe to see if it flows without hinder into the epidural space above the membrane. Ideally the test with the saline syringe should be with a well lubricated glass syringe since this gives the absolute indication that you are in the right space. If not re-angle the needle and syringe and try again.If you are sure that you are in the right space, now attach the prepared syringe with 20 mls of lignocaine with adrenaline or bupivicaine and then inject slowly. After 10 minutes see if analgesia has been achieved and then prepare for the operation. Seldom in a fit adult patient is there need for any drip but check the BP as with any epidural anaesthesia. The likelihood of this is much less than in lumbar epidurals. For surgery on the lower abdomen tip the patient's head down after giving the caudal to get the analgesia higher up. There is a tiny risk if you are still learning the procedure that you may go into a vessel such that the lignocaine could even cause convulsions. stop injecting immediately and give diazepam to stop the convulsions. If this rarity should happen you should consider an alternative method of anaesthesia. Caudal analgesia is an alternative way of giving analgesia during labour but then the dose would be reduced and the patient's head would need to be tipped down markedly to get the benefit.

Lumbar epidural

You need to learn this from an expert. Go in (after infiltrating the area down to the thoracolumbar fascia with 1% lignocaine) between L3/L4 for lower abdominal surgery or L2/L3 for higher and for delivery needs. If possible use a Tuohy needle since this reduces the risk of penetrating the dura and going into the spinal canal. Advance slowly and test regularly with, if possible a well lubricated glass syringe, otherwise an ordinary syringe with air. Bounce the plunger and as soon as you have loss of resistance, as you go through the ligamentum flavum, and the air flows unhindered remove this syringe and attach the syringe with the anaesthetic agent. Give 7-10 mls of the anaesthetic agent for the lower abdomen, 8 mls during labour and delivery and 15 mls for Caesarean section. Use 0.5%

bupivicaine or 1.5% lignocaine with adrenaline as standard but in Caesarean section mix 1/2 bupivicaine and half lignocaine. You will need to have a drip going prior to the epidural and after the epidural has been given measure the BP every 30 seconds for the first 10 minutes. Some would recommend giving 50 mg ephedrine subcutaneously 1/2 hr. before the procedure to avoid the risk of BP drop. If there is significant BP fall give 25 mg. ephedrine diluted with 10 mls saline i.v. giving 1 ml at a time until the BP is stabilized. If this is unavailable give adrenaline 1/2 ml of 1/1000 strength but the effect though quick may be short-lived. Start to operate after 10-15 minutes.

Subarachnoid or Spinal

Have a drip running. Use 0.5% bupivicaine without adrenaline: 3 mls for operations up to the umbilicus (T10) or 4 mls up to T6 level. In pregnancy or in the elderly use only 2 mls. Follow up the BP carefully and give i.v. fluids and ephedrine as necessary. Some would give ephedrine 25 mg into the paravetebral muscles as a prophylactic after the spinal has been given. In pregnancy as soon as the spinal has been given, lie the patient on her left side for 1 minute and then (e.g. at caesarean section) have her lie supine with a wedge under her right hip so as to tilt her 10-15 º. Keep talking to the patient and if she starts to whisper this may indicate a high spinal which will have to be dealt with urgently.
The onset of anaesthesia in a spinal is quick and deep and after 10 minutes you can operate. With bupivicaine you will have 3-4 hours of good analgesia with relaxation of the abdominal muscles and less bleeding than in Ketalar anaesthesia. Using a very thin needle for the lumbar puncture the riks of post-spinal headache is very small. If this should occur treat severe headaches with ”blood patching” at the site of the spinal. An **epidural blood patch** is a surgical procedure that uses autologous blood in order to close one or many holes in the dura mater of the spinal cord, usually as a result of a previous lumbar puncture. The procedure can be used to relieve post dural puncture headaches caused by lumbar puncture (spinal tap). A small amount of the patient's blood (10 mls) is injected into the epidural space near the site of the original puncture; the resulting blood clot then "patches" the meningeal leak. The procedure carries the typical risks of any epidural puncture. However, even though it is usually effective, further intervention is occasionally necessary.
An epidural needle is inserted into the epidural space at the site of the cerebrospinal fluid leak and blood is injected. The clotting factors of the blood close the hole in the dura.
As such, the autologous blood does not "repair" the leak, but rather treats the patient's symptomology.
It is also postulated that the relief of the headache after an epidural blood patch is due to more of a compression effect than sealing the leak. Because the fluid column in the lumbar spine is continuous with the fluid around the brain, the blood exerts a "squeeze" and relieves the low pressure state in the head.

Local anaesthesia

This is very useful for opening abscesses. Infiltrate a ring or quadrant around the inflamed area just outside the outer edge of inflammation. Use 1% lignocaine without adrenaline using the finest needle that you have available. Inject very slowly just under the skin and slowly move around keeping within the anaesthtized area into the adjacent area. Wait 10

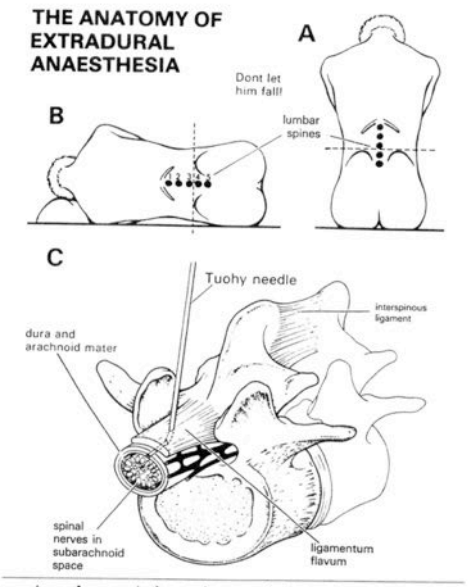


*Fig. 1. The anatomy of epidural and subarachnoid anaesthesia. **A**, the anatomy for lumbar puncture with a patient in the sitting position. **B**, with the patient in the lying position. The line between her iliac crests passes between her 3rd and 4th lumbar spines. **C**, an epidural needle goes first through her interspinous ligament and then through her ligamentum flavum before it reaches her extradural space. In this figure her interspinous ligament has been dissected away in the segment through which the needle is passing. For subarachnoid anaesthesia the needle goes further on through her dura and arachnoid mater into her subarachnoid space, which is filled with CSF. Illustration from Primary Anaesthesia. King M (ed). Oxford Medical Publications, 1986.*

nal anaesthetic solution. The recommended doses are as follows:

2.0–2.5 ml of 0.5% **heavy** bupivicaine or
2.0–2.5 ml (max 2.8 mls in a very large woman) of plain 0.5 % bupivicaine or
1.4–1.6 ml of a **heavy** solution of 5% lignocaine or
2.0–2.5 ml of plain 2% lignocaine with 0.2 ml of 1/1000 adrenaline.

Withdraw the spinal needle, introducer and syringe as one and apply a sticking plaster to the site. Some would routinely give an intramuscular injection of ephedrine 25 mg into the paravertebral muscles through the anaesthetized skin after removing the spinal needle in order to decrease the risk of BP drop.

13. Lie her down on her left side for 1 minute and then have her supine with a wedge under her right hip giving her a tilt to the left of about 10–15°. If you have given a **heavy** spinal anaesthetic fluid tip the bed with the head upwards 10° while the anaesthetic is fixing, whereas with the other isobaric anaesthetics have the table level.
14. Have a nurse monitor the Blood Pressure every 1/2 minute calling out the level each time for the first 5 minutes and then every minute for the next 10 minutes and thereafter every 5 minutes.
15. Keep talking to the patient to enable you to assess from her replies how she is feeling. If she begins to whisper this may be a sign of a high spinal which will have to be dealt with quickly.

The advantages of a spinal over an epidural are that the onset of anaesthesia is rapid (within 10 minutes), it gives a very dependable deep anaesthesia with less bleeding, the gut maintains its tone, the muscles of the lower abdomen are relaxed, there is relatively little BP drop, it lasts for 3–4 hours, and provided thin needles are used the rate of headache afterwards is low (with a 25 gauge

minutes and then operate. You can use 200 mg maximum (20 mls of 1% or 40 mls of 1/2% The dose can be increased by 50% by giving it with adrenaline but then it will take longer to act.

Psychiatry at grass-roots level

During my first 14 years in charge of a district hospital in Zambia I was the only doctor in the district. Before arrival I suspected that this would be the situation and so I had taken extra post-graduate training in surgery, obstetrics and gynaecology, paediatrics as well as Internal Medicine and my own speciality, Infectious Diseases. What saved the situation was working with an outstanding group of nurses and midwives, initially all from Sweden and then successively all from Zambia. The challenge was to increase their capacity to become assistant medical officers and to be able to deal with most problems that doctors would deal with in Sweden.

One area where I felt very inadequate was in Psychiatry. Although there is some evidence that the milder neuroses are less frequent in low-income-countries than in high-income-countries, I knew that there was just as high a prevalence of the severe psychoses and we had nowhere to refer such patients. We had to be self-sufficient.

Two things happened that made life easier. The first was that I got hold of the newly published first edition of the "Oxford Textbook of Psychiatry" which became my "Bible" in dealing with severely psychotic patients. The second was the arrival of depot psychotherapeutic agents. Of course these were not then available in Zambia but I wrote to one of the earliest manufacturers and said that I would be willing to carry out a trial of their preparation in a rural setting of a low-income-country. They were very interested and so we got good supplies of their medicine free. We now had a means of helping the severest psychotic patients to get stabilized enough to function almost normally in their home village settings. The local belief in the adequacy of all injectable medicines was an added bonus to getting good compliance. Many families were very strict about seeing that their member of family who needed the continued medication came at the right time.

Of course there were dramatic episodes that had to be dealt with. One of our patients with severe schizophrenia who had been completely impossible to stabilize on oral mediciation previously was now very stable on the depot preparation for a number of years. She then went away to distant relatives for a few months and was without medication. She came back in a psychotic relapse with a dramatic presentation in front of a full church, listening to my father preaching. This lady ran to the front of the church, stripped off to the buff and then made the sign of the cross in front of the pulpit (she was from a Catholic background). My father was stunned into silence, the audience was in uproar, and then a group of women surrounded her and wrapped her round with their loin cloths and tried to lead her out of the church. After once more making the sign of the cross she then went quietly with the group of women and we could take her down to the hospital to give her help. My father's sermon never really took off after this episode.

We had a very pleasant lady who has episodes of mania where the form of her mania was house-cleaning. She would come in with one of her manic episodes and after we had given her the first dose of her sedative, before it had had time to work she would get started on her ward removing everything from every cupboard and every store-room. She would pile everything in a huge heap in the middle of the ward, ready for her to start her spring cleaning. Just as she finished emptying everything out, the sedative would finally start working and she would fall asleep against the heap. It took hours to get everything back to where it came from.

One episode was particularly dramatic and particularly satisfying to manage. About 5 km from the hospital there was a government secondary boarding school for the province. It was the hottest time of year when everyone was feeling worn out from sleepless nights because of the heat. The school term was only a couple of weeks away from the final exams which for many students was a frightening hurdle. They only got one chance and if they failed they could not go on with their education. Suddenly one of the girls in the senior year, who had always been a leader in the school, started to behave strangely. They found it impossible to communicate with her. She started walking with a dancing rhythmn bending over backwards until finally she was in an exaggerated opisthotonus position as she danced forward. Her behaviour spread to many of the other girls in the school (the school was co-educational but only the girls were affected). The teachers panicked as this spread further and further and they took a group of girls into the government hospital 70 km away for lumbar punctures in case this was a new epidemic of some unknown virus. Finally 120 girls were dancing in a similar manner. One Saturday evening they brought the most affected group of girls to the hospital on the back of a big truck and by this stage their behaviour was quite violent. They were throwing themselves on the floor and against the walls in a quite frightening and dangerous way. I was called to the scene and the description I was given on the phone convinced me that this was epidemic hysteria. As I left to cycle down to the hospital my wife gave me the answer to the right management.

We had learnt a lot from our first Swedish midwife who built up the whole maternal health care in the district. Once in a while a primip would have a hysterical attack during the labour, very often at the critical stage of the final push. This would be quite dangerous

to the outcome of the labour and the survival of the baby. So the midwife would fill a bucket of cold water, throw it over the primip, the hysterical attack would be over, she would push and the baby would arrive safely and all would be fine.

We had once used this method when our young daughter had had a very frightening temper tantrum and we couldn't get through to her. We took her into a cold shower with clothes on and all and within seconds she was back to normal and humming a song that she had learnt about how we should try to make everyone around us happy. My wife reminded me of this as I was setting out for the hospital.

When I arrived at the emergency department it was in absolute chaos. The noise level was unbelievable, crowds of onlookers had arrived from the villages around to make the whole scene even more dramatic. We started a relay of nurses taking the students one by one into a cold shower and as soon as they came out of their hysteria they were led away to sleep it off on a mattress. In the middle of the drama a government psychiatrist arrived (the school had somehow contacted him and he had come 110 km loaded with diazepam and just stood goggle eyed as our relay of nurses managed the whole treatment without any drugs).

This episode confirmed to me that sound common sense and simple solutions to difficult problems can sometimes embellish even the most trying of crises.

Pueperal Psychosis

A specific form of psychosis that is often difficult to deal with is Pueperal Psychosis (1:500 deliveries). This may take various forms but the most frightening condition is a very aggressive form of anger and hostility with sometimes violence to the caregivers and family. I had to handle just such a situation and the level of violence was alarming. All the normal psychotherapeutic agents that were recommended in my Psychiatry and Obstetric textbooks failed to make any impact whatsoever despite high dosage. I finally remembered one of our good friends who was being treated for her epilepsy but whose biggest problem was recurring episodes of severe violent temper tantrums. Finally when she went over to carbamazepine therapy the temper tantrums virtually disappeared. We started this treatment of our patient with Pueperal Psychosis and the reponse was immediate and sustained, almost as though night had suddenly gone over to day.

The benefits of traditional diet with high fibre content according to Dennis Burkitt: FRS

Geographical epidemiology studies by Dr Dennis Burkitt showed that in communities with a traditional high fibre diet the following diseases were either extremely rare or never seen:

Appendicitis, Cancer of the large bowel, polyps of the large bowel, diverticulae of the large bowel with diverticulitis, gallstones and cholecystitis, haemorrhoids, varicose veins and a number of other diseases which have a more multifactorial cause but where diet is also central. These include myocardial infarction and type 2 diabetes.

Other diseases are much less common. Here the protection of a traditional life style is more

likely to be the presence of intestinal helminths, giving a more "normal" immune picture in the bowel system. These uncommon diseases protected in this way include various allergies, the inflammatory bowel diseases such as Crohn's disease and ulcerative colitis. There may even be a protective effect against many of the autoimmune diseases which are rare in these communities such as ankylosing spondylitis, systemic lupus erythematosis (SLE), multiple sclerosis, sarcoidosis, ulcerative colitis, Hashimoto's thyroiditis, Addisonian and pernicious anaemia. In these diseases there appears to be a dysfunctioning of the immune system and a "normal" immune picture in the bowel system may have a major protective function since it is the largest sector of the immune system.

In the two conditions which are rare in traditional communities: haemorrhoids and varicose veins, on top of the benefits of a high fibre diet giving soft stools is the traditional mode of defection adopting a squatting position. This closes off the veins for the rectum and anal canal as well as the legs and thereby protecting the venous valves from damage during straining at defaection. This position also relaxes the ring of muscle around the anal canal again making defaecation easier. This squatting position is easily achieved even with a modern sit-down toilet by placing a stool in front of the toilet seat and place your feet on the stool while sitting on the toilet and then hugging your knees during defaection.

Haematology when resources are scarce or minimal

Limits of Laboratory help: When you are faced with a health center or Hospital with a very primitive lab. or with no laboratory and no trained staff in laboratory skills you may have to build a simple unit with maybe local skilled workers who are open to receive training in some of the key assessments needed in haematology and health evaluation. One of the simplest skills to teach is the use of a good haemoglobinometer such as the BMS instrument. This gives an accurate evaluation of the patients' Haemoglobin and costs virtually nothing to run with a high sensitivity and specificity. It uses saponin sticks to haemolyze blood samples placed on a special slide and another slides over the first so you have a standard film of oxyhemoglobin read off by a compact easy-to-use diagnostic photometer that requires few supplies. The saponin sticks can be replaced by a simple match stick with a tiny smear of soap which haemolyzes the blood sample. When you are skilled and use this instrument with pedantic care you have your result within minutes and can get an answer if significant anaemia is present.

Anaemia and Iron Supplementation

There are many aspects of anaemia that need treatment that is not too expensive:

1. Treating suspected or diagnosed hookworm infestation Ancylostoma duodenal or Necator americanus with e.g. single dose of Albendazole
2. Prevention and treatment of malaria and especially in young children and pregnancy introducing **intermittent preventive treatment in pregnancy** (IPTp) and in young children (see P. 27,28).
3. Studying if new recommendations for nutritional improvement to increase iron intake in normal diet in a way that is possible and acceptable for that community e.g. introducing **soya beans** in a way that will become a permanent addition to the traditional diet (e.g. making sure that all soya beans are put into boiling water for 30 minutes before preparation of food so that the bad smell and

taste are removed). Soya beans have many benefits including a valuable iron content.

Frequency of iron supplementation

Numerous studies assessed by the United Nations group ACC/SCN focussed on nutrition advice have evaluated whether the frequency of iron supplementation can be reduced from daily to twice or once per week without compromising the efficacy of supplementation. The efficacy of once- or twice-weekly supplementation in school-age children, adolescents, and nonpregnant women is promising, and the operational efficiency of intermittent dosing regimens is being evaluated. (While research is ongoing to evaluate these regimens in different population groups, the current recommendation remains daily supplementation for young children and pregnant women).

Administration of iron supplements every third day may be as effective as daily administration in improving iron status, as first reported in anaemic rats [10]. If less frequent intake was also effective in humans, it could have important implications for the organization and efficiency of iron-supplementation programmes. It could affect the distribution of tablets, the compliance of subjects, and the total costs of the programme. Two studies were conducted in Jakarta, Indonesia, to compare the effect on iron status of daily versus less frequent supplementation.

The effect of daily versus twice-weekly iron supplementation on iron status was studied in preschool children with low iron levels in a randomized, double-blind field trial [11]. For eight weeks, one group of 32 children received 30 mg iron per day and another group of 33 received 30 mg iron twice a week. Haemoglobin, serum ferritin, and protoporphyrin levels increased significantly in both groups. The difference in treatment effect between groups was not significant after correction for initial haemoglobin level, which was not similar in the two groups (fig. 4). It was concluded that for pre-school children with low iron levels, twice-weekly iron supplementation has an effect on iron status similar to that of daily supplementation.

Treatment of anaemia with weekly iron was investigated in non-pregnant woman factory workers [12]. for nine weeks, 42 women received iron tablets (60 mg Fe, 250 g folic acid) daily, and 38 women received the same tablet once a week. Haemoglobin concentrations of the two groups increased to 16 and 13 g/L, respectively ($p = .145$). It was concluded that weekly supplementation with a relatively low dose of medicinal iron was as effective as daily supplementation in improving the iron status of women with moderate anaemia.

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It appears that giving iron supplementation as well as Vitamin A Supplementation (where there is Vit.A deficiency) in anaemia is more effective that iron on its own.

Your skilled assistant in a simple laboratory can also be trained to check for Malaria using blood slides stained with appropriate stains, or if you have access to the rapid assessment cards for malaria train them in using these. Likewise train him/her to assess faeces samples for helminths in the bowel and other parasites and check urine samples for micro-

haematuria using the ordinary urine sticks and then search for parasites especially Schistosomiasis but also evidence of urinary tract infections. Much more advanced is to check blood samples for other parasites especially Trypanosomiasis (African Trypanosome Rhodesiensie -Sleeping sickness) transmitted by biting Tsetse flies. Likewise check blood samples for glucose levels especially in malaria cases and severe malnutrition but also for rare diabetes patients.

Blood grouping limits: In the early stages of building up a lab. there may be considerable problems checking Blood grouping when planning blood transfusions. Until a properly trained laboratory assistant is available blood grouping can easily be measured using Eldon Cards from Denmark. All the staff including nurses and medical assistants can learn easily to check for Blood groups. Many countries in Africa have no Rhesus negative patients among their indigenous patients and so this spares the problems in late pregnancy and the situation at delivery with a collision between a Rhesus negative mother and a Rhesus positive child that has to be dealt with using protective anti-D Immunoglobulin if available at all.

Getting a blood bank going: With blood transfusions there may need to be initially a walking Blood Bank with all staff having been Blood grouped so that if a patient needed blood transfusion their blood group can be checked and if you couldn't get an appropriate blood group in any of their accompanying relatives, then you can get hold of the appropriate blood donor among your staff and collected their blood and give this freshly to the patient. In an emergency if you a universal donor having Blood group O positive and since indigenous patients virtually never have Rhesus negative blood this universal donor can donate their blood to them. In the long run you need to build up a proper blood bank where blood is not only grouped but checked for HIV, Hepatitis and syphylis. This need becomes acute when HIV / AIDS came into the picture.

HIV testing of blood: Today there are excellent checks for HIV but initially this was with HIV-Check cards. In many settings the older generation has seldom any risk of being positive and thus their blood can often be used.

Crises needing blood transfusion: A major need for blood transfusion is in catastrophic bleeding related especially to **Post-Partum haemorrhage** (the biggest cause of maternal death in the world). This risk is made worse if the delivering woman has had severe anaemia before the delivery. Use of the practical Partogram (Philpott) reduces risk dramatically. Likewise strict adherence to **A**ctive **M**anagement of the **T**hird stage of **L**abour (AMTL) (**Oxytocin, Early clamping of cord, Brant-Andrews delivering placenta, brisk massage of uterus, early exploration if placenta is not completely delivered**) will reduce the risk for PPH by up to 80%. (However when PPH comes, despite this standard treatment at delivery occasionally a frightening haemorrhage can ensue. Here a new break-through is the use of the **Shivkar method using a condom and Foleys catheter** introduced into the uterus and blown up simultaneously as the uterus is stimulated with oxytocin given i.v. This has been tested in large scale trials in Bangladesh, Egypt and India and called the Shivkar method after Professor Shivkar from Mumbai, India. (The success of reducing Maternal Mortality Ratio in Rufigi area, Tanzania has confirmed how easily this method can be spread and used by health staff after delivery when needed).

With aseptic precautions prepare a sterile firm rubber catheter or a medium-sized Foley

catheter (size 14-18) fitted with a condom where the spermicide has been washed off first with antiseptic solution. Tie the condom onto the catheter near the mouth of the condom by a silk or chromic catgut thread and then insert into the uterus. The inner end of the catheter remains within the condom about 4 cms from its tip .Connect the outer end of the catheter with a saline set and inflate the condom with 250-500 mL of running normal saline according to when bleeding stops. Observe the bleeding and when it is reduced considerably, stop further inflation. The outer end of the catheter is folded and tied with thread. Maintain uterine contraction by oxytocin drip for at least 6 hours after the procedure. Keep the uterine condom tightly in position by a ribbon gauze pack or another inflated condom placed in the vagina. Maintain inflation of the condom catheter for 12-24 hours (up to 48 hours in extreme cases), depending upon the initial intensity of blood loss, and then deflate gradually over 10-15 minutes and remove. Bleeding usually stops within 15 minutes in more than 90% of cases of PPH. Seldom does a patient need further intervention. There is virtually no risk of intrauterine infection if preventive antibiotics are given.

Other causes of severe bleeding needing blood transfusion includes Road Traffic Accidents with overloading of vehicles, primitive roads poorly maintained, vehicles not kept in good repair with deficient brakes. Above all is the threat of lack of seat belts or the absence of using these seat belts even when these are available.

Place of auto-transfusion: Another crisis related to obstetrics if the severe bleeding caused by an **extrauterine ruptured pregnancy. Auto-transfusion** can be used at laparotomy in order to restore blood circulation. This is often done when the abdomen has been opened using a sterile scoop pouring the liquid blood through a funnel with a sterile gauze as a filter into a donor set (with its own extra filter during subsequent transfusion). Sometimes while resuscitating with Ringer's lactate prior to operation and an obvious extensive intraperitoneal blood loss, a large bore needle can be inserted into the abdominal wall and connected to a donor set collecting enough blood to be given while awaiting blood from the blood bank. After scooping out as much liquid blood as is available for autotransfusion (Fig. 7) and removing large blood clots feel for the uterus and lift this high to see where the ruptured ectopic is sited.

Even ordinary late incomplete spontaneous abortions may have bled so much that Blood transfusion is imperative.

Peritoneal transfusion of blood: Apart from Obstetrics our commonest reason for the need for transfusion was in young children under 3 years with severe Malaria. In situations that you meet the **extreme anaemia** (seen more in younger children) use an alternative to iv. blood: give the blood that is needed to save their lives intraperitoneally. This is easier to learn and teach others to use. It reduces the risk of overloading the heart causing heart failure when blood is given too quickly without strong diuretics. It has its special use in situations with an epidemic of severe malaria with dozens of children needing blood. Here are the details: Identify a point half way between the Umbilicus and the Xiphisternum. Sterilise the skin with iodine in spirit. After preparing the blood of the right blood group, connect a needle to a giving set with normal saline. Penetrate the skin only, at a right angle to the skin, and then fully open the tap to the giving set. Advance the needle slowly and as soon as the saline starts to flow (you are now into the peritoneal cavity), shut it down, connect the giving set to the blood and give the quantity of blood

needed for the level of anaemia found and then withdraw the needle. This method is easy to teach staff at small rural hospitals and is very effective. It seems that it is the coelomic cells of the peritoneum that captivate the blood with the whole blood cells and transfer this to the general blood system. This avoids the risk of causing congestive cardiac failure when blood is given i.v. too fast and without strong diuretics. This same focus of absorbing peritoneal blood is used in the new Misgav Ladach method for Caesarean Section (clearly shown to cause minimal bleeding) where at the end of the operation only blood clots are removed from the peritoneal cavity before closing up. The fluid blood stays behind and is taken up again by the coelomic cells.

This method of peritoneal transfusion has not been tried in children in shock who are moribund and here I would always use intravenous transfusion but of course given very slowly with strong use of diuretics to avoid congestive cardiac failure.

Impact of Roll Back Malaria on malaria severe anaemia: The impressive effects of the "Roll Back Malaria" programme launched by Gro Harlem Brundtland when she was leader of WHO and expanded with the help of the Global Fund has meant that these crises for small children are now much less common.

Other crises demanding Blood transfusion: Of course we also needed blood transfusion after severe injuries from wild animals, especially crocodiles, hippoes, and occasionally lion, leopard and Buffalo attacks but also crimes of violence with knife lacerations. All health staff in contact with patients should be trained in the right way to stop bleeding in a crisis e.g. using pressure of a thumb in a life-threatening haemorrhage from a deep knife laceration or with a broader wound using the pressure of the whole palm to stop the haemorrhage.

Severe anaemia of other causes.: Here are our challenges with severe anaemia to the extent of needing Blood transfusion in those whose lives were threatened. The commonest causes here were:

1. **Lack of iron** in the diet where the staple diet of maize porridge with green leaves and simple vegetables as relish had very little iron content and meat and fish were almost distant dreams than realities for most families. When giving iron supplement remember two rules: (a) **never give iron to severely malnourished children and older patients with a bacterial infection** since this will stimulate increased multiplication of any bacteria present (severely malnourished children have bakteraemia in 70% of cases). Likewise **never give iron to any patients with severe infections** for the same reason. Cancel any iron supplements inherited from their medical list on arrival with an infection. If any of these (Malnourished or with severe infections) have significant anaemia needing treatment give them rather blood in small doses to get them out of their immediate need. Once their crisis with malnutrition or severe infection is over you can restart iron. **Dosage of iron supplements:** Use much smaller doses than are traditionally used. Research around the world has shown that even in iron deficiency **one dose per week** or **maximum twice a week** is as effective as three doses a day and of course cheaper with far less side-effects.

Frequency of iron supplementation

Five studies were assessed by the United Nations group ACC/SCN focussed on nutrition advice. They were evaluating whether the frequency of iron supplementation could be

reduced from daily to twice or once per week without compromising the efficacy of supplementation. The efficacy of once- or twice-weekly supplementation in school-age children, adolescents, and nonpregnant women was promising, and the operational efficiency of intermittent dosing regimens is still being evaluated. (While research is ongoing to evaluate these regimens in different population groups, the current recommendation remains daily supplementation for young children and pregnant women) until enough Randomised Controlled trials have been analyzed by a Cochrane review.

Two of the studies

Administration of iron supplements every third day may be as effective as daily administration in improving iron status, as first reported in anaemic rats [10]. If less frequent intake was also effective in humans, it could have important implications for the organization and efficiency of iron-supplementation programmes. It could affect the distribution of tablets, the compliance of subjects, and the total costs of the programme. Two studies were conducted in Jakarta, Indonesia, to compare the effect on iron status of daily versus less frequent supplementation.

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It appears that giving iron supplementation as well as Vitamin A Supplementation (where there is Vit.A deficiency) in anaemia is more effective that iron on its own.

2. **The impact of certain helminths causing anaemia,** especially the hookworms (Ancylostoma duodenale and Necator americanus) but also Trichuris trichiura. where when these are in large numbers in the intestine cause anaemia as the parasites suck the blood for their own use. However even though treatment for these worms using a single dose of Albendazole is necessary when anaemia is severe. But remember the

   Value of helminths: The presence of Intestinal Helminths and their eggs (found in 1/4 of the world's people) stimulates Th2 cytokine production which limits helminth

colonization. Th2 responses can modulate immune reactions to unrelated parasites, bacteria and viral infections. Failure to acquire parasites and mucosal Th2 conditioning predisposes to Crohn's disease which has overtly active Th1 inflammation.in the long run a **small number of helminths in the intestinal system** has a positive value in protecting the intestine from the aggressive diseases such as Crohn's disease, Ulcerative colitis and probably even many of the autoimmune diseases (such as ankylosing spondylitis, systemic lupus erythematosis (SLE), Hashimoto's thyroiditis, Addisonian pernicious anaemia, multiple sclerosis, sarcoidosis). which are never seen in communities with intestinal helminths. It appears as though their presence in the intestine give a more balanced immune system with . The intestines have a major resevoir of immune capacity in the body.

3. A real challenge with anaemia problems in tropical Africa is the presence of Sickle-cell anaemia. **Sickle-cell anaemia (SCA)**

This was first described by John Herrick in 1910. It is one example of a number of haemoglobinopathies that are described in LIC. In SCA valine is subsituted for glutamic acid in position 6 of the beta chain in the haemoglobin molecule.

In 1941 it was found that children with this condition had a normal Hb at birth and as the child matured so its Hb dropped and became abnormal. Most developed hand-foot syndrome with tender swelling of the small bones in hand and feet between 6-12 months age. Later they developed pain and swelling in the larger limb bones. It was postulated that at birth they had a different Hb (foetal haemoglobin) that was later replaced with abnormal Hb when maturing. This turned out to be so.

In 1949 Linus Pauling showed on electrophoresis of the blood that the affected children had HbSS whereas the normal is HbAA. At birth they all have HbFF. Those children with only one gene have HbAS. There are globally about 78 million carriers of sickle-cell trait with 65 million of these in Sub-Saharan Africa. In tropical Africa more than 30% of the adult population can have HbAS.

SCA is found mainly in Africa but also in parts of the Mediterranenan area and parts of the Persian Gulf area. Each year about 300 000 infants are born with SCA (2006) with 200 000 of these in tropical Africa and 150 000 in Nigeria alone. About 5% of the world's population carry the sickling gene.

The solubility of the HbS molecule is much reduced compared to HbA especially in the doeoxygenated state and polymeric chains are formed with finally distortion of the red cells. The red blood cells form a sickle shape when the oxygen tension in the blood goes down. In those with only one sickling gene, i.e. their Hb is AS, they are completely normal until the oxygen tension goes very low when they start to sickle as well.

In early rural tropical Africa with inadequate access to health care less than 2% of children with SCA survived beyond 4 years. Today (2006) 5% of all U5M in many countries in Sub-Saharan Africa is due to SCA.The most severe episode for a child with SCA is a sickling crisis with bone marrow hypoplasia, massive haemolysis, sequestration of red blood cells (RBCs) in the spleen, hypersplenism and folic acid deficiency. The red cell survival time may go down to 6-8 days because of the fragility of the sickled cells and their phagocytosis by the RES. The sickled cells adhere to each other and to the endothelium causing blockage of small vessels and infarcts. The haemoglobinaemia consumes complement and diminished opsonization e.g. of pneumococci. Immunization against pneumococci may

become possible in the future when prices come down. Tissue necrosis encourages bacterial growth and there is risk for osteomyelitis and pyelonephritis.
There are often Xray changes in the small bones of the hands and feet with aseptic infarctions and multiple areas of small bone destruction. Salmonella osteitis (50% are S. typhi) may occur in these areas as a secondary infection. These children have many episodes of severe pain in their limbs. The shape of their skull may be abnormal because of hyperplasia of bone marrow.
They often have periods of severe abdominal pain. The spleen may get infarctions due to the clumping of abnormal RBCs. The most dangerous situations can be when they are anaesthetized with inadequate oxygenation when a sickling crisis can be provoked.
They have an inborn partial protection against malaria since their Hb makes invasion of the RBCs by the malaria parasite more difficult. However this is not absolute and protection against malaria is important in SCA. Malaria is the commonest cause of a severe haemolytic crisis and all with fever and anaemia are treated for malaria urgently. Malaria is the commonest cause of death in SCA followed by pneumococcal septicaemia.
In the CNS they may get signs of meningism, hemiplegia, coma and blindness as infarctions from clumps of sickled cells affect various parts of the CNS.
One particular emergency is severe chest pain which may be due to pneumococcal pneumonia but could also be due to bone marrow fat embolization or pulmonary infarction or bone pain crisis in the thoracic cage.
Most children with SCA have a Hb of around 8 gms/dl when stable. They need **treatment** with folic acid to allow for production of new red cells to replace those broken down, good malaria prophylaxis, pneumococcal and hemophilus B vaccination, quick access to acute care in a crisis, excellent anaesthesia when needed, and caution in giving iron supplementation since they can easily become overloaded.
One hope for the future is that by genetic engineering it may be possible for them to revert to Hb FF (the foetal form of Hb) when they can function much better. A current treatment is to increase the amount of HbF by use of **hydroxyurea 500mg/day** (10-15 mg/kg body weight) increasing the dose if tolerated.
Girls in puberty and afterwards who are treated with **Depot Provera** have less sickling but they are of course unable to conceive while on this.
In Jamaica with an active programme of early identification and treatment the average mean survival age for people with SCA is 53 years for men and 58.5 years for women.

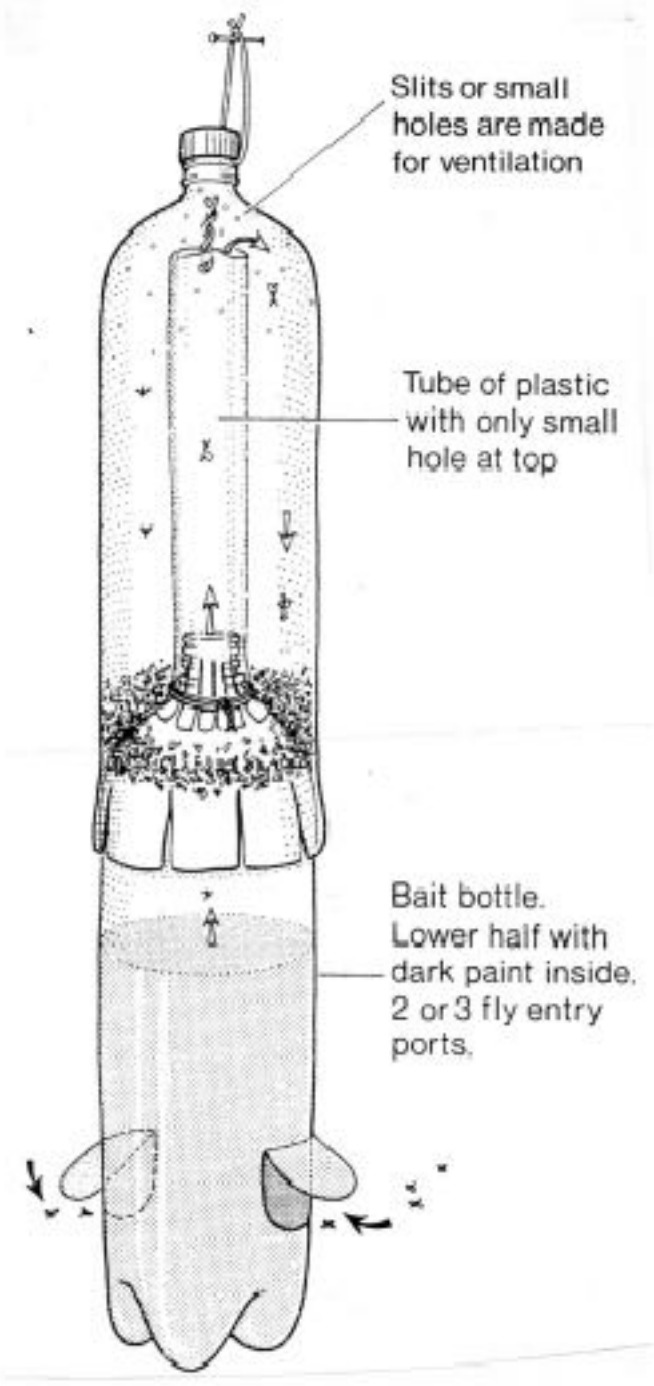
Lancet June 19 2016 Sickle Cell Anaemia

To coincide with World Sickle Cell Day on June 19, *The Lancet* is publishing its first haematology Series commissioned to review three topical and clinically important aspects of sickle-cell disease.
At least 90% of children and adults with sickle-cell anaemia live in sub-Saharan Africa and in south Asia, where the disease remains life threatening, particularly in childhood, and where the burden of the disease is expected to rise. For children living in high-income countries, mortality due to sickle-cell anaemia has been dramatically reduced to less than 2% by 15 years of age, but as children live longer, age-dependent end-organ dysfunction has assumed greater importance in clinical management.

David Morley

Flies are a danger for both adults and children when they spread bacteria and viruses from person to person. It is especially dangerous for children in places where the huts are next to cattle e.g. many Masai villages. Here is a simple way to reduce this danger from flies:

The concept behind this fly trap is to construct it as simply as possible using material that is junk. It is particularly hoped that this may be a way of using discarded pop and drinking water bottles.



The TALC Fly TrapMaterials required

Two preferably identical clear plastic bottles. The larger the better, they can be smooth or corrugated. One of the bottles should still have its screw top.
One smaller plastic bottle, this should be smooth plastic.
A small quantity of black or dark paint.

Tools required

Stanley or other sharp knife.
A small piece of string.
A pencil or other pointed instrument to make a small hole in the plastic bottle.
A candle.

Method of assembly

One of the bottles is the bait bottle the other is the trap bottle the smaller bottle is used to cut out the trap tube.

The Bait bottle

If the paint is very thick it may need diluting. Pour the equivalent of a tablespoon of paint into this bottle, if possible do not let it run down the side; roll the bottle so that the lower third is painted on the inside. Leave it to dry.

The Trap bottle

Cut the bottom out of this. Make the cut just below where the bottle tapers into the base. Now make 8 slits upwards from where the base has been cut off. If the lower end of the bottle is corrugated, make the slits in the valleys. It should now be possible to push the trap bottle over the top of the trap bottle and make a tight fit. If at a later stage the splits in the side you have cut tend to tear further upwards this can be prevented by gluing small squares of plastic. Alternatively a ring of plastic is cut obliquely from

another bottle of the same size, this can then be slipped over the bottle to prevent the cuts spreading upwards.

If the flytrap is to be hung introduce a small piece of string under the screw top, screwing the top on tightly.

The Trap Tube

This is a piece of plastic cut from the body of the smaller bottle. Cut a piece of bottle 8 cms by 8 cms. Cut small slits in the bottom and bend these out as shown in the diagram. Now roll it around a pencil, wrap a piece of string around it and place it in hot water (three-quarters boiling one-quarter cold.) Remove the string, it should keep its shape. Make a hole in the screw top as follows. Hold it over a candle, the plastic will darken and soften. Push a pencil through and enlarge the hole. Push your tube up and through this hole and the frill you cut should now be pinched between the bottle top and the cap when it is screwed on to the bait bottle.

The Bait bottle

The paint in this should now be dry. Cut two half circles half way down the painted part at opposite sides of the bottle, the curve of the circle should be upwards, now bend the flap produced outwards and force them down so that they remain open. These are the entry ports for the flies, as well as putting bait in the bottom of the bait bottle put some on these turned down flaps to attract the flies.

The Fly Bait

Various baits have been used. Chicken entrails seem satisfactory but tend to dry up. Apparently flies like the smell produced by placing 250 gms of yeast in a litre of water and after two days adding 6 grams of Ammonium Carbonate (available from garden centres). Amongst the Maasai a mixture of goat dung and cows urine is effective.