

Appropriate Obstetric Technologies to Deal with Maternal Complications

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Table of Contents

Table of Contents	1
Summary	2
Introduction	3
Infections and Hypertension	4
Postpartum Haemorrhage	6
Obstructed Labour	8
Abdominal Delivery	8
Caesarean Section under Local Anaesthesia	10
Misgav-Ladach Method.....	10
Abdominal Delivery by Whom?.....	11
Vaginal Delivery	11
Symphysiotomy.....	11
Vacuum Extraction.....	13
Conclusion	15
References	16

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Summary

This overview has its focus on “appropriate” obstetric technologies to meet some prevalent maternal complications. It is argued that “technology” should be defined in management terms and comprise therapeutic management and not only manual maneuvers and interventions. This is particularly relevant when discussing pregnancy malaria. The maternal complications addressed comprise postpartum haemorrhage, obstructed labour, genital sepsis, pregnancy-induced hypertension/eclampsia and cerebral malaria. Among them postpartum haemorrhage and obstructed labour have been given more attention than the others. Active management of third stage of labour is documented along with current manual and pharmacological management rules for handling postpartum haemorrhage. Focus here is on the “UniJect” device, on misoprostol and on abdominal compression of the aorta.

The problem of obstructed labour is discussed in two categories, abdominal delivery and vaginal delivery. Caesarean section (CS) under local anesthesia, the Misgav Ladach method, delegation of performing the CS to non-doctors are issues addressed. Appropriate technologies for vaginal delivery in cases of obstructed labour comprise symphysiotomy and vacuum extraction. Reasons for focusing specifically on these two entities are given.

In conclusion, it is argued that each era and each setting have their specific demands on “appropriateness” of obstetric technologies to deal with serious maternal complications. The importance of non-prejudiced opinions (symphysiotomy, CS under local anesthesia) is underscored. A corresponding need of strictly evidence-based clinical practice is emphasised.

Introduction

The Greek word "obstetrix" means "standing besides and wait", implying primarily a non-intervention attitude but certainly a preparedness if complications would arise. When we speak about "technology" we tend to imply more than a mechanical handling of events. Rather, the technology is now by and large corresponding to management practices. This understanding is underlying the current attempt to outline "obstetric technologies". When it comes to the concept "appropriate" it might imply a number of eventually positive characteristics. For the author of this paper it implies a number of subordinate attributes, e.g., available, acceptable, adequate, affordable, sustainable, attractive and meeting people's needs.

For this review there are the following terms of reference:

What is the evidence of the effectiveness and relevance of obstetrical technologies used nowadays to deal with maternal complications? In some settings, the answer for any obstetric complication is the caesarean section; in other settings vacuum extractors are still not known and therefore not used; symphysiotomy is a forgotten technique. Which are the possible appropriate obstetric technologies for obstetric complications and clarify the evidence for using them appropriately?

The concept "obstetric complications" is very wide. We shall here, within the very limited space available for this review, focus on those more life-threatening complications that we normally refer to when we discuss severe maternal morbidity and maternal mortality. In so doing we have a number of significant "obstetric complications". Among those most important ones we have focused on the following entities:

1. Postpartum haemorrhage;
2. Obstructed labour;
3. Puerperal sepsis;
4. Pregnancy-induced hypertension/ eclampsia;
5. Cerebral malaria.

Infections and Hypertension

In the list of five major obstetric complications presented here there are two, that are more directly related to the birth itself, postpartum haemorrhage and obstructed labour. The remaining three, genital sepsis, pregnancy induced hypertension/eclampsia and cerebral malaria are not directly related to the birth process itself but occurs commonly associated with the peripartal period.

Puerperal sepsis as consequence of postpartum endometritis-myometritis occurs typically several days up to two weeks after delivery (Libombo *et al.* 1994). New evidence regarding the etiology of genital sepsis indicates that unhygienic handling of the birthing process itself (repeated vaginal examinations with poor manual hygiene) is not the only or even predominant cause of this pathology. An unexpected association between low birth weight deliveries and childbed fever/ genital sepsis has been demonstrated in Mozambique (Bergström & Libombo 1995). It appears that sub-clinical intrauterine infections during pregnancy provoke preterm birth of low birth weight newborns with high risk of congenital foetal infection, leaving behind an infected uterine cavity with ensuing clinical endometritis-myometritis, which may deteriorate in puerperal sepsis (Nadisauskiene *et al.*, 1996). One interesting feature is the suggestion that the birth canal might benefit from washing with antiseptic solutions, whereby a vulnerable, low birth weight newborn might not be further infected by vaginal pathogens. Some studies indicate that a routine using vaginal washing might be beneficial (Stray-Pedersen *et al.* 1999). If both endometritis and congenital infection of the newborn are related to subclinical, antenatal intrauterine infection such vaginal washing would offer insufficient protection. Against the additional danger of ascending, vaginal pathogens postpartum (associated or not associated with the manual hygiene of the birth attendant) such flushing may potentially provide some additional protection for the mother and also for the newborn. There have been doubts expressed, however, regarding this routine (Rouse *et al.* 1997) and more research remains to be carried out particularly in settings where puerperal sepsis is prevalent.

Cerebral malaria is coming up as a major maternal killer and contributor to severe maternal morbidity in several countries in sub-Saharan Africa and in southern Asia (Brabin 1991). It might be argued that "appropriate obstetric technology" is not relevant when discussing treatment of cerebral malaria during pregnancy. However, as has been stated already, we have opted to consider "technology" in a broad sense and we do think that the specific therapeutic requirements in pregnancy malaria make it necessary to mention these management aspects here. The increasing drug resistance (above all to chloroquine but also in some areas to sulfadoxine-pyrimethamine/Fansidar) has made more and more countries reluctant to provide conventional chloroquine prophylaxis during pregnancy. Instead the concept of repeated therapeutic treatments (clearance of parasitaemia) has won more and more acceptance. Intermittent sulfadoxine-pyri-methamine treatment in pregnancy has shown that such a regime will lead to a highly significant reduction in the incidence of LBW in infants born to primigravidae, even if the women have HIV infections (Verhoeff *et al.*, 1998). The pregnancy malaria situation in the world is by and large deteriorating and frustrated attempts are legion to curb the growing threat of malaria maternal mortality (Granja *et al.* 1998). There are no immediately available "appropriate obstetric technologies" to manage this growing malaria threat. New drugs are not available or accessible for wide utilization in the countries most affected or they are too expensive to be considered "appropriate".

Pregnancy-induced hypertension/eclampsia is a major contributor to severe maternal morbidity and maternal mortality. The management routines have been quite variable over the last decades but hopeful signs of a scientific approach have emanated from the multicentre study comparing magnesium sulphate and diazepam (Anonymous 1995). This study indicates that the drug of choice in treating eclamptic patients should be magnesium sulphate, since this drug gives fewer recurrent convulsions than diazepam. Still, several centres, above all in the UK prefer other drugs than magnesium sulphate. The understanding of the pathophysiology of pregnancy-induced hypertension/ eclampsia has contributed largely to the choice of magnesium sulphate with concurrent volume substitution to maintain optimum circulation in

the vasospastic, and hypovolemic disease of eclampsia, where hemoconcentration and hypoperfusion are important characteristics.

Postpartum Haemorrhage

In many studies on maternal mortality postpartum haemorrhage (PPH) is the predominant cause of death. PPH is thus a major challenge in programmes aiming at reducing maternal mortality. There are two major lines of thinking in the management of PPH.

Still, the first line of thinking addresses the problem of bleeding after delivery by trying to avoid drugs and just try to use "natural methods". The proponents of this line of thinking argue that drugs may be disposable and not necessary if proper handling of the birthing process takes place. Examples of such handling is putting the newborn baby to the nipples and stimulating it to suck, whereby endogenous oxytocin will be released from the pituitary, giving uterine contraction and less risk of PPH.

This approach has been tested in settings, where it has been used by traditional birth attendants (Bullough *et al.* 1989). It has been found inefficient even if theoretically attractive and potentially appropriate.

The second line of thought is promoting active management of third stage of labour, comprising three different components:

- a) injection of oxytocin;
- b) early cord clamping;
- c) controlled cord traction.

It has been convincingly demonstrated that the use of oxytocin injection significantly reduces the risk of PPH (Prendiville *et al.* 1999). There is a widespread consensus that early cord clamping and controlled cord traction contribute to the prevention of PPH, though this has not been subject to scientific scrutiny. The principal problem here is that the drug (oxytocin) is seldom readily available for routine use during labour.

A substitute for oxytocin is methylergometrine. Its use to pregnant women with hypertension is not recommended but the risks of deteriorating vasospastic disease should be balanced against the potential benefit of achieving a uterine contraction in case of impending or obvious PPH. The major drawback with methylergometrine is, however, that it is unstable in daylight and in adverse environmental circumstances. Studies have indicated that much of its effect is lost under the circumstances prevailing in most low-income countries (de Groot 1996). There is no doubt that oxytocin should be promoted as the drug of choice in preventing and treating abundant bleeding after delivery.

Oxytocin injection requires syringe and needle, which are largely unavailable in many settings in rural areas. There is also a risk of re-utilization of used syringes and needles in areas where HIV infection is prevalent. In order to overcome this hurdle we have tested the device "UniJect" in Angola for its appropriateness to prevent PPH. The preliminary results clearly indicate that this device, filled with 10 IU of oxytocin, used intramuscularly immediately after expulsion of the newborn significantly reduces the prevalence of PPH (da Silva *et al.*, unpublished). The acceptability of this routine among midwives and parturient women is good (Jangsten *et al.*, unpublished) and a mass production of this oxytocin-filled device is a promising new appropriate technology for the years to come.

A new interesting technology for PPH prevention has recently emanated. The prostaglandin E₁ analogue misoprostol is subject to a multicentre trial to test its advantages/disadvantages in relation to oxytocin given as described above. Preliminary results from several smaller studies indicate that misoprostol is not of greater benefit than oxytocin for the prevention of PPH. However, misoprostol can be given orally, vaginally or rectally and is heat-stable and not requiring injection (syringe and needles) and will for that reason remain as an attractive and potentially appropriate method for the prevention of PPH. Presumably there is much more to be said about misoprostol as an appropriate obstetric technology, since appropriate dosage has not been researched completely (Bugalho *et al.* 1995). It is further probable that

other prostaglandin analogues will appear, since the need for a cheap, temperature-stable and orally active prostaglandin, like misoprostol, is obvious.

A forgotten highly appropriate management principle in PPH is manual compression of the abdominal aorta, a technique that by and large seems to be forgotten in big textbooks. It is described in some literature (Bergström *et al.* 1994) and should be given renewed attention. It can be used immediately after delivery as a bimanual technology, using one hand at the level of the umbilicus to compress the abdominal aorta between the closed fist and the vertebral column, and using the other hand in the groin to confirm that the pulsations of the femoral artery are vanishing. It can also be used as an internal preoperative procedure, by which the assistant compresses the abdominal aorta above the uterine level and below the liver level across the bowels. In either case the maternal blood flow will be efficiently stopped above the aortic bifurcation, which implies reduced or stopped blood flow to the uterine artery with ensuing reduced uterine bleeding. Direct compression of the abdominal aorta is presumably much more efficient than packing the vagina with cloth, since this does not control the arterial blood flow above the lesion or from the non-contracted uterus.

Even if the clinical experience of applying compression of the abdominal aorta is massive, the efficacy of this manoeuvre is seldom addressed in scientific studies (Kinsella *et al.* 1990, Riley & Burgess 1994, Keogh & Tsokos 1997).

Obstructed Labour

From the terms of reference given for this review it is obvious that “appropriate obstetric technologies” refer mostly to this entity. For all obstetricians the “pandemic” of rising CS rates in the world should be a matter of concern (Vimerkati *et al.* 2000). It is obvious that centres with low CS rates do not automatically have higher perinatal mortality rates than centres with higher CS rates (Bergström *et al.* 1994). This “pandemic” may be acceptable, adequate and affordable in some settings but is certainly not affordable, available and sustainable in other, poorer settings.

Obstructed labour is defined from observing the process of labour from the first stage of cervical dilatation through the second stage of expulsion. The diagnostic technology implicit in the *partogram* is particularly appropriate (WHO 1994). There is no doubt that the partogram has meant dramatic if not revolutionary improvement in the perception of the birthing process in countries where no such notion was present before. Some recent reports have elaborated on modifications of the conventional WHO partogram with alleged advantages. In one study the action line was subject to a randomised trial, indicating that the CS rate was lower when labour was managed using a partogram with a four hour action line (Lavender *et al.* 1998). In other studies innovative reconstructive steps have been taken to facilitate partogram use (Wacker *et al.* 1998, Tay & Yong 1996). It has been alleged that its use is complicated, since it demands the skill of mathematical abstraction (Dujardin *et al.* 1992, Walraven 1994). Even if it is useful in peripheral units its use in higher-level health care centres has been advocated (Lennox 1981).

Obstructed labour - *sensu strictiori* - implies an obstacle to deliver via the vaginal route. Since both the mechanical components in this process, the foetal head and the mother’s pelvis, are both to some extent malleable, obstructed labour can be overcome by a variety of means. In the following we are going to make a distinction between management of obstructed labour by abdominal delivery and by vaginal delivery.

Abdominal Delivery

While general agreement seems to prevail in most settings that a minimum CS rate might be of the order of 5% many studies now reveal that the CS rate may be well below 1% in many settings. Calculations on “unmet obstetrical needs” can use the verified CS rate as against the calculated need of CSs in a defined population. The difference in such settings from the reality in more affluent settings is striking considering CS rates in the order of 50-70% in some urban settings. The reasons for this “pandemic” in current CS practices have been ascribed to fear of legal consequences of alleged mismanagement and to proper commercialisation of obstetric practice (Vimerkati *et al.* 2000).

International comparisons have shown that there has been no improvement in perinatal mortality that parallels the steep increase in CS rate (Figure 1). An increasing number of unnecessary CSs will also lead to an increasing number of unnecessarily ruptured uteri in subsequent pregnancies.

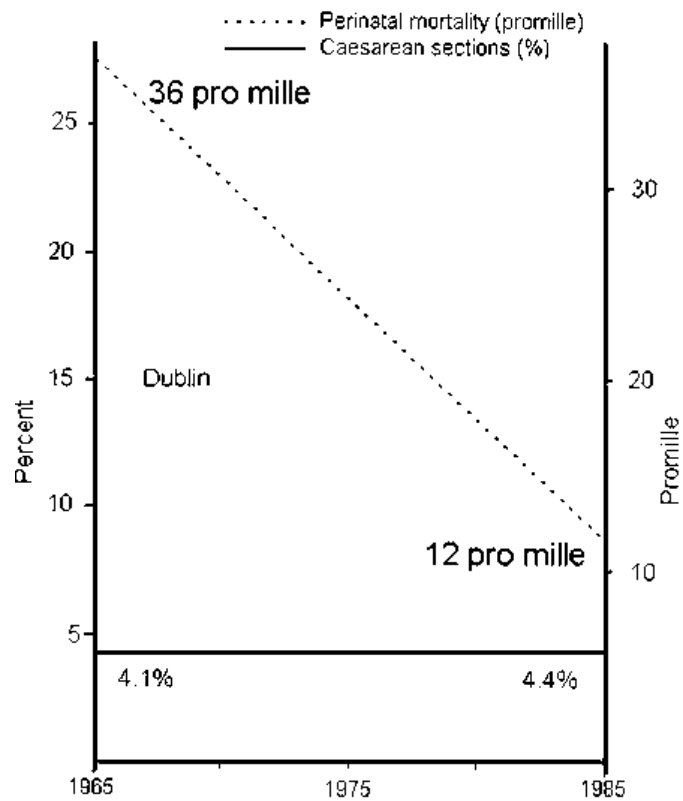
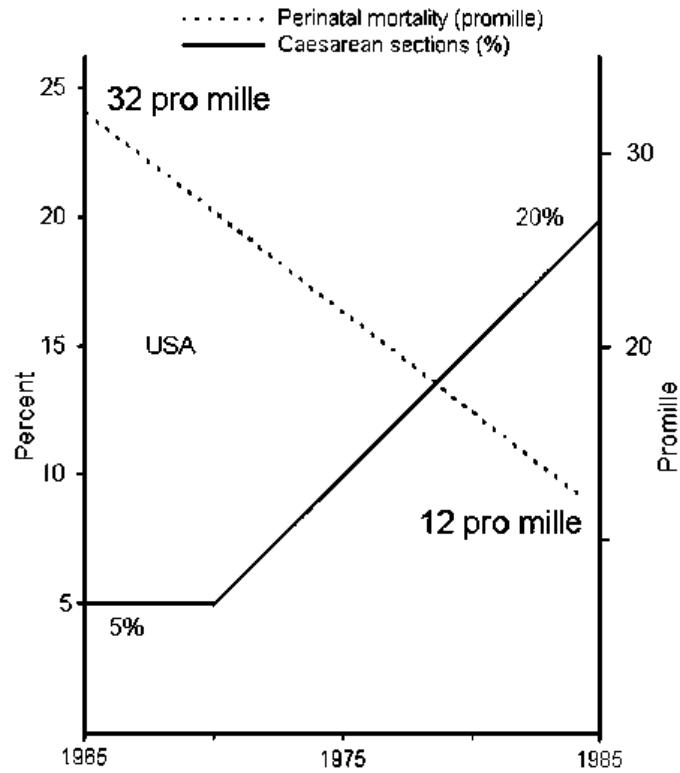


Figure 1. The upper diagram reflects the tendency in the USA towards high frequency of caesarean sections, while the lower diagram shows the situation in Dublin, Ireland where a very low frequency of caesarean sections has been maintained. The perinatal mortality has undergone a more or less identical development in Ireland as in the USA.

In many cultures CS is regarded as a reproductive defeat. There is a high risk that such women will not come back for institutional (potentially abdominal) delivery and will give birth at home, with an increased risk of uterine rupture.

Almost all CSs in low income countries are emergency interventions and most of them take place with IV anaesthesia or with spinal anaesthesia. The obvious need to decentralize CS to the first referral level and, potentially, even to more remote health units brings CS in local anaesthesia into focus. Since this technique is not well known among doctors trained in well-equipped hospitals it will be addressed here.

Evidence-based opinions are scarce in the field of CS carried out with infiltration anaesthesia, particularly under conditions prevalent in low-income countries. The practice described below might be a point of departure for further research (Moir 1986, Hood 1988).

Caesarean Section under Local Anaesthesia

Surgical interventions, like the one to be described under this heading, are for natural reasons seldom subject to controlled trials. It is a life-saving intervention in remote, resource-poor settings, where abdominal delivery with general anaesthesia is impossible or dangerous. For these reasons the intervention will be described in some detail, since it appears to be underutilized in most hospital settings, in low-income countries.

For local anaesthesia of the abdominal wall a solution of e.g. lidocaine-adrenaline is infiltrated in the midline from the umbilicus to the symphysis. In addition to these midline doses four points should be selected a thumb-width from the midline on each side. These four points should correspond to the extension of the incision. At each point the local anaesthetic is injected to reach the rectus sheath. Once this infiltration is complete, the abdominal wall is cut open down to the linea alba and the solution is infiltrated through the midline and in the parietal peritoneum immediately below the linea alba along the planned incision. The peritoneal cavity is opened and additional solution infiltrated just above the upper border of the bladder along the line of peritoneal incision. If pain is provoked on the upper part of the symphysis a few mls of solution are injected into the rectus insertion in the superior pubic periosteum.

A good alternative to infiltration anaesthesia is spinal anaesthesia. In some cases, however, the patient's circulation may be in danger and any hypotension provoked by a spinal anaesthesia may be unacceptable. This is particularly true in desolate cases of premature detachment of the placenta, heavy bleeding or other situations giving rise to hypovolemic shock. In such cases local anaesthesia as described above is preferable infiltration.

Misgav-Ladach Method

Circumstances for CS surgery prevailing in most low-income countries are characterized by scarce resources. One such scarce resource is time. A second one is material, sutures, transfusion blood, and other theatre necessities. A third one is the human resource (see below).

There are seldom possibilities to take cosmetic aspects in consideration when choosing method of CS incision. Most often a lower midline skin incision is carried out and less often a low, transversal incision (Pfannenstiehl). Another method, which has recently gained much attention, is the Misgav Ladach method, which offers a number of advantages by economising with operation theatre time and with material resources. The method is briefly a modification of the Pfannenstiehl incision but located at a higher level. It is characterized by much less sharp dissection, taking into account the vascular anatomy of the abdominal wall and it allows for a most significant saving of time and material. This has been clearly shown recently in a randomised trial in Dar-es-Salaam, in which the savings were clearly demonstrated (Björklund *et al.* 2000). Some anecdotal evidence indicates that long-term postoperative abdominal adhesions might be a problem but this remains to be investigated fully.

Abdominal Delivery by Whom?

One particularly tangible disadvantage of abdominal delivery is that it cannot be carried out in remote rural areas, since there may not be any doctor available capable of carrying out a CS. In most parts of rural Africa this pressing problem has to be solved in the era of "Safe Motherhood". Several African countries (Tanzania, Malawi, RDC) have experience of delegation of responsibility of CS to non-doctors. During the war in Mozambique we had the opportunity to initiate a training of assistant medical officers ("técnico de cirurgia"). This category of surgically trained medical assistants has been very efficient in increasing access to life-saving skills for women previously deprived of them. Two published scientific studies on the quality of care provided by this category of staff have demonstrated that it constitutes a valuable asset in the often frustrated attempts to provide life-saving skills for populations living in remote areas. In the first study approximately 2,000 CSs were followed, half of which were carried out by ob-gyn specialists, with the remaining half being carried out by "técnicos de cirurgia". The postoperative outcomes were compared. No clinically significant differences in postoperative complications occurred (Pereira *et al.* 1996). In the second study more than 10,000 surgical operations were followed, of which 70% were emergency interventions. Obstetric interventions dominated largely and the follow-up results were astonishing. For elective surgical interventions the postoperative mortality was 0.1% and for emergency interventions 0.4% (Vaz *et al.* 1999). It should be added that among the emergency interventions there were quite complicated interventions like total hysterectomy, splenectomy, bowel resection and fetotomy.

Vaginal Delivery

For a large proportion of women with obstructed labour the delayed progress might take place only during the last part of the first stage or to the second stage during labour. Several circumstances may explain such late obstructed labour, e.g., soft tissue obstruction or outlet obstruction. With seemingly sufficient uterine contractions such late obstructed labour may be a problem not automatically necessitating abdominal delivery. In this situation vaginal extraction might be contemplated and particular attention will be given to the appropriateness of two specific interventions, both of which have their proponents and opponents, symphysiotomy and vacuum extraction.

Symphysiotomy

Cutting through the symphysis pubis cartilage as a means of widening the birth canal during protracted deliveries was common in Europe a century ago and has been practised even later. Thanks to improvements in surgery, CS has, however, become much more common in such situations though symphysiotomy is still practised when neither hygiene nor other material resources permit abdominal surgery. It is simple to perform and makes a negligible demand on resources. It is *not*, however, an alternative to CS in general but only in cases with a moderately contracted outlet of the pelvic canal.

Symphysiotomy is controversial most frequently among those who lack personal experience of the method. If indications are strictly adhered to, available evidence is today overwhelmingly in favour of symphysiotomy, particularly in situations when there is no access to CS, as is the case in most rural areas of low-income countries (Seedat & Crichton 1962, Lasbrey 1963, Bird & Bal 1966, Bird & Bal 1967, Gordon 1969, Hartfield 1973, Armon & Philip 1978, Norman 1978, van Roosmalen 1987). For later pregnancies, after a CS carried out for disproportion, the pelvis remains narrow and the woman is left with a uterine scar. Approximately 25% of uterine ruptures can be estimated to be caused by ruptures of old CS scars. The risk of maternal death in vaginal deliveries following a caesarean delivery (for disproportion) is thus obvious. Culturally, obstructed labour is sometimes branded as a punishment for infidelity and CS is often regarded as a reproductive failure on the part of the woman. Once operated upon, the woman may not feel willing to return for a new CS.

Symphysiotomy is less dangerous than CS in countries where resources are minimal. Mortality figures of around 1-3% are common in conjunction with CS in low-income countries (van Roosmalen 1990). The obstetric situation, in which a mother suffering from obstructed labour, with the foetal head deeply engaged in the pelvis, consults a small, remote hospital after perhaps two to three days of labour, illustrates the value of symphysiotomy. The mother's condition may be poor due to anaemia, dehydration and exhaustion. Symphysiotomy may save the life of both mother and child in such a situation. The problem with symphysiotomy is hardly a technical one: the difficulty lies first and foremost in deciding *at what point* during delivery the operation should be carried out. A fundamental precondition for symphysiotomy is that a moderate disproportion actually exists and manifests itself clinically. Symphysiotomy is thus not recommended as a means of preventing foreseeable disproportion.

It is important to underscore that the normal symphysiolysis occurring at the end of pregnancy allows the pelvis to achieve a certain elasticity, facilitating the passage of the foetus. This stretching of the pelvis is indispensable for birth in the same way as is stretching of the perineum. In both tissue areas, however, the need for surgical support may be indicated and symphysiotomy may be considered as an analogy to perineotomy (episiotomy).

There are several overviews depicting the pros and cons of symphysiotomy. Very few of these studies are controlled trials and the current practice is mostly based on relatively limited series of cases (Hartfield 1973, van Roosmalen 1990).

Symphysiotomy is indicated in cases with obstructed labour due to a limited fetopelvic disproportion which may be overcome by surgical widening of the symphysis (up to 2.5 cm). The most clear-cut example of proper indication is the situation with fully dilated cervix, the foetal head at or below the spinal level and unsuccessful vacuum extraction in spite of adequate maternal expulsion efforts. Major constrictions of the pelvis (true conjugate less than 8 cm) render symphysiotomy unsuitable, even if all remaining preconditions for such an operation exist. An asymmetrical pelvis resulting in obstructed labour is also an unsuitable indication for symphysiotomy. Likewise, suspicion that a child has a weight > 4500 g makes this operation less suitable. A general rule is that labour should have progressed so far that at least 1/3 of the head has passed the pelvic inlet. The presenting part should ideally be the head, in vertex presentation. Face presentation may be accepted though subsequent use of a vacuum extractor is thereby excluded. Symphysiotomy can be carried out in certain breech cases but only with an aftercoming head (Spencer 1987).

The speed with which the operation must be conducted in such cases necessitates an experienced surgeon. The urgency increases the risk of lesion of the bladder and urethra, particularly since the urethra in these cases cannot be moved digitally from the midline. As an alternative and complement to using forceps on the aftercoming head in breech presentation, symphysiotomy has thus been shown to be of value.

Kenneth Björklund, a Swedish researcher in our department, has currently made a comprehensive review of symphysiotomy practice with emphasis on the last century 1900-1999 (Björklund, unpublished). His findings are noteworthy. During the first half of the century, 41 maternal deaths were reported in 2,515 symphysiotomies (1.6%), sepsis being the main cause and 217 perinatal deaths (9.3%). During the second half of the century, three maternal deaths were reported in 1,929 symphysiotomies, (0.16%), two from eclampsia and one from pulmonary embolism after a complementary caesarean section, and there were 187 perinatal deaths (11.6%).

The outcomes of symphysiotomy and caesarean section were compared in ten studies. During the first half of the century, six studies comprising 490 symphysiotomies and 636 caesarean sections showed 2% maternal and 6.1% perinatal deaths with symphysiotomy, compared to 7.7% maternal and 4.1% perinatal deaths with caesarean section. During the second half of the century, four studies comprising 307 symphysiotomies and 571 caesarean sections showed 0.3% maternal and 12% perinatal deaths with symphysiotomy, compared to 1.8% maternal and 11.6% perinatal deaths with caesarean section. The need for blood transfusions was analysed in a study comprising 210 patients with cephalopelvic

disproportion (CPD). In the symphysiotomy group (n=105), eight patients received a blood transfusion (all 1000 ml), compared to 19 patients in the caesarean section group (n=105) (average 1050 ml, range 500 - 2000 ml).

Obstetric fistulae were reported in 26 cases during the first half of the century (1.3%), as compared to 34 cases (1.8%) during the second half, in the main analysis comprising 4,500 cases (percent figures adjusted for missing data). One third of the fistulae were reported as caused by pressure necrosis in the second half of the century. In some cases the fistulae were caused by accidental incision of the bladder or urethra, especially when a urinary catheter was not used. Traumatic forceps delivery preceded the fistulation in a number of cases. In a separate analysis of small series 1902-1985 (twelve papers), seven obstetric fistulae were reported in 131 symphysiotomies (5.3%).

Symphysiotomy was extensively used, reported and analysed during the twentieth century. The findings of Björklund's review indicate that a re-appraisal of the position of symphysiotomy is needed in view of the enormous loss of life and the morbidity associated with obstructed labour in today's world.

The aim of a correctly conducted symphysiotomy is to achieve a separation of the symphysis pubis of about 2.5 cm (approximately equivalent to the width of a thumb), thereby increasing the surface area of the pelvic inlet by approximately 20-25%. If no progress occurs despite this increase a more advanced disproportion is probable. Successful vaginal delivery is unlikely and CS will be the only alternative.

Complications are few. The review quoted indicates that symphysiotomy is associated with almost negligible mortality. Postoperative stress incontinence may occur in a few percent of operated cases.

Fistulae at the urethrovaginal or vesicovaginal level rarely occur when symphysiotomy has been correctly carried out. In the review by Björklund 13 references are quoted 1902-1904 comprising 138 symphysiotomies, among which there were seven (5.1%) fistulae after symphysiotomy. As already mentioned, episiotomy is a good prophylaxis. If a fistula is caused by the symphysiotomy itself the chances of its healing are good using only an indwelling catheter since the tissues are not devitalised in the same way as when the fistulation is caused by fetal pressure on the birth canal.

Postoperative difficulty in walking may be caused by some pain and discomfort. According to reports published, difficulty in walking is rare more than 2 months after symphysiotomy. Back pain post-partum seems to be more common after CS than after symphysiotomy. Back pains are probably connected to overstretching of the sacro-iliac joints. This can be prevented by employing a strict upper abduction limit of the hip joints during the operation and by adducting the knees between symphysiotomy and the delivery proper.

In most cases, a symphysiotomy is considered to enlarge the pelvic inlet permanently and subsequent deliveries are usually easier. The cut in the cartilage joint normally heals with a fibrous tissue, which is considered to be stronger than the original cartilage tissue. A symphysiotomy can, however, be carried out even if the urethra lies adherent to the rear of the area being operated on. The urethra will, however, be particularly vulnerable in a subsequent symphysiotomy. In certain cases an ossification of parts of the symphysis pubis joint can also be seen. This can render a renewed symphysiotomy more difficult.

Vacuum Extraction

Instrumental vaginal extraction of the baby, in cephalic presentation, may be undertaken by use of either forceps or vacuum extractor. Safe use of obstetric forceps requires considerable experience from obstetric operations in general and from use of the instrument itself. Most obstetricians consider that forceps should be used solely by obstetrically trained doctors. During their obstetric training the use of this important instrument should be taught and practised. The risks of maternal damage are high if the forceps is used by inexperienced staff, and this cannot be recommended.

The vacuum extractor (VE) has several features especially advantageous in labour wards in the developing world. Correctly utilized, the disadvantages are few (Johansson & Menon 2000). It can be used without hurting the mother and, if correctly applied, does not create disproportion or interfere with the normal mechanism of internal rotation. Unlike obstetric forceps, it does not occupy the vital space between the head of the fetus and the wall of the birth canal.

The fact that the VE is easy to use without hurting the mother may also lead to misuse. Misuse often results in failure, sometimes seriously injuring or killing the baby and discredits the method as it is blamed for the bad results.

Misuse of VE must be avoided and the four principal indications respected:

1. *delay in the pelvic floor phase*. The head has been on or just above the pelvic floor for 60 minutes with full cervical dilatation.
2. *foetal asphyxia*. Vacuum extraction is not too slow if the instrument is already assembled and the operating vacuum induced rapidly. A prerequisite is that there is no access to rapid CS and that the foetal head is at least at the spinal level. Symphysiotomy should be considered as an adjunct measure.
3. *maternal distress*. For termination of the second stage in the case of physical distress, or if an emotionally distressed mother does not respond to customary management.
4. *extraction of second twin with asphyxia*. Foetal distress in the second twin with cephalic presentation should be managed by VE, also if the head is above the spines. Deflection must be avoided at any price and difficulties in positioning the cup motivate internal version and podalic extraction rather than VE.

All presentations other than cephalic ones are incompatible with the use of VE. Some cephalic positions such as face and brow presentations are also counterindications. It is possible to correct some cephalic deflection positions by positioning the cup close to the small fontanel.

There is wide agreement that VE is safe for the mother (Johansson & Menon 2000). Any complications which may occur in cases where VE has been applied can rarely be attributed to VE itself, provided the indications are observed and the safety rules respected. Vacuum extraction is no substitute for caesarean section. When the latter is not available, however, and it is deemed prudent symphysiotomy should be performed according to good symphysiotomy practice and in combination with careful vacuum extraction. This method will save innumerable lives.

Conclusion

Each era and each setting have their specific demands on “appropriateness” of obstetric technologies. The field is vast indeed and is ready to be invaded by scientists with the intention to strengthen the evidence against and in favour of certain interventions, which have been described above. One of the most important fields to elucidate is obstructed labour in rural areas. There is little room for condemnation of methods like symphysiotomy until we know more about its advantages and disadvantages in relation to CS in controlled, randomised trials. It is obvious that even in affluent settings obstetric practice does not always follow evidence-based rules. There is a much perceived need of scientific rigour in the field of appropriate obstetric technologies. Obstructed labour is one particularly good example in this regard.

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