

## Chapter 1

# Operative vaginal birth in the 21st century: a global perspective

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### Key learning points

- The varied epidemiology of birthing around the world (and even the differences within one country) are attributable to both obstetric and midwifery practice styles and birthing agenda priorities.
- The skills required for vacuum extraction and forceps do have some commonality, but also have some quite distinct differences. Trainees wishing to master vacuum extraction skills for rotational and midcavity procedures need to pay careful attention to flexion point cup application. Vacuum extraction is truly an assisted birth strategy that requires coordination of strong uterine contractions, good maternal expulsive efforts and a combination of midwifery and obstetric skilled assistance during the procedure.
- Trainees who wish to gain additional operative obstetric experience in a developing country setting should choose training sites where the rate of operative vaginal birth (OVB) is more than 3%.

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### Historical perspectives

Obstetric forceps to assist birth of the baby date from the 16th century and were developed by three generations of the Chamberlen family. Between 1600 and 1920 over 700 types of forceps were designed; examples of about 100 of these can be viewed in the RCOG museum. Nowadays only four or five types of obstetric forceps are still in use. In most parts of the world, the proportion of assisted births performed by forceps is being overtaken by vacuum extraction procedures.

The earliest vaginal operations performed to assist birth were destructive. Destructive procedures to assist the birth of hydrocephalic and dead infants became standardised in the 19th century, only to become virtually obsolete in the 21st century in developed countries. Nevertheless, destructive operations are still life-saving procedures in developing countries, where performing caesarean section for neglected obstructed labour with a dead fetus can lead to maternal death, and delivering a hydrocephalic fetus by caesarean section is pointless if there is no expert paediatric neurosurgical and lifelong aftercare capacity available.

Although there were various attempts to design a vacuum extractor before the 1950s, modern vacuum extraction dates from 1953 when Professor Tage Malmström of Sweden developed the first modern vacuum extractor. Dr GC Bird made important modifications in the 1970s. In particular, Bird separated the suction and traction ports to make cup detachments less likely and also designed an occipito-posterior 'OP cup' with the suction port sited at the lateral margin of the cup, which allowed easier placement of the cup over the flexion point on the fetal scalp for occiput transverse and posterior positions.

In many ways OVB is at a crossroads: on the one hand rising caesarean section rates will be seen by some as making OVB virtually a redundant procedure, while in other places where OVB is practised, the clinical scene (both service and skill transfer capacity) can be quite disparate from country to country and even between facilities in the same country. Because of this, in many places, a full range of OVB skills have been lost or remain only in the hands of older practitioners who are no longer involved in teaching trainees. Nevertheless, there is still a window of opportunity for OVB skills to be retained; indeed, this is one of the reasons this book was commissioned by the RCOG.

Nowadays, concerns regarding OVB that need to be addressed at a national and institutional level in many countries are:

- what place does OVB have when second-stage problems arise?
- where should OVB be carried out?
- who should be authorised to perform it, and under what circumstances?

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### Current trends

#### General notes on vacuum extraction and forceps to assist vaginal birth

The RCOG Green-top Guideline No. 26: *Operative Vaginal Delivery* states that 'the operator should choose the instrument most appropriate to the clinical circumstances and their level of skill', and that 'obstetricians should be confident and competent in the use of both instruments for non-rotational deliveries and at least one instrument for rotational delivery'.<sup>1</sup> In fact this competency goal is quite difficult for most trainees to achieve in contemporary specialist training programmes. Many trainees complete their training within one obstetric service. In a particular hospital it is most unusual for there to be equal skill among the consultant trainers for both methods of assisted birth. Those obstetricians who mainly use forceps to assist birth sometimes consider using the vacuum extractor when there would be difficulty in applying the forceps, e.g. when the cervix is not fully dilated, when the head is in the midcavity or for rotational deliveries. It is not reasonable to expect good results when one uses an instrument that is not one's preferred instrument for more challenging clinical scenarios. On the other hand, vacuum extractions tend to be carried out by the more junior medical staff, and often without expert back-up from senior consultants who (for historical reasons) are more likely to be 'forceps users'.

The skills required for vacuum extraction and forceps do have some commonality, but distinctions can be made. However, the technique of use, good clinical practice points, common difficulties and pitfalls encountered and potential complications for the two procedures are markedly different.

The varying circumstances of practice between countries and hospitals within countries mean that, unless a trainee has opportunities to be trained in a variety of hospitals and regions, it is unlikely that the goals of the RCOG Green-top Guideline on operative vaginal delivery will be attained. One of the purposes of this book, and the ROBuST training course that accompanies it, is to ensure that trainees have the opportunity to develop skills in both methods of OVB.

#### Recent trends and perspectives in the developed world

Whereas UK caesarean section rates soared from 3% in 1960 to 33% in 2009 (since when the rate has remained steady),<sup>2</sup> in the USA and UK OVB rates have been quite steady since the 1970s at 9–12%.<sup>2</sup> However, in spite of fairly steady rates of assisted birth, the indications and clinical

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scenarios have changed considerably since the 1960s. Nowadays, few midcavity and 'trial' procedures are performed. Also, the trend to resort to caesarean section when there is malposition of the occiput or deflexion started before there was general availability of the Bird posterior cup, and before the development of other manoeuvrable cups such as the Kiwi Omnicup. The great majority of assisted births nowadays are what used to be called 'lift-outs'; i.e. from very low station and when the main problem is soft tissue resistance and inability of the woman to produce effective expulsive efforts to complete her delivery (often compounded by epidural analgesia).

From the 1950s (when the modern vacuum extractor was developed in Sweden by Malmström) and the 1970s, it was usual that hospitals, obstetric services and, indeed, countries were wont to use one method of assisted birth or the other, but not both. Even today it is not uncommon for hospitals to have 'rules' governing when trainees may or may not assist vaginal birth; indeed, the forceps (or certain types of forceps) or the vacuum extractor have been banned from some obstetric services. This has usually followed a complication caused by improper use of a particular instrument.

Although there have been attempts since the 1990s in most developed country obstetric services to train and use both methods of assisted birth, two other distinct trends have developed:

- where both instruments are used, there is a steady trend for a greater proportion of the OVB procedures to be performed using the vacuum extractor<sup>3</sup>
- in many places fewer vaginal births are assisted and caesarean section is being employed more often for second-stage problems.<sup>4</sup>

As a result of these trends, young obstetricians may begin specialist practice with little experience in performing midcavity or rotational procedures. The trend to subspecialisation has also contributed to de-skilling in operative obstetrics as many newly qualified consultants regard their obstetric practice as only a transitional career phase.

### Trends in the developing world

In the developing world, tradition and local conventions often reign supreme and the hierarchical nature of the medical profession make it difficult for someone to (re-)introduce skills. In large capital city teaching hospitals there may be only four or five consultants in a clinical unit or practice and, for

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all sorts of reasons, both logistic and socioprofessional, there is often little in the way of hands-on teaching for trainees in the labour ward. Lack of hands-on supervision in the labour ward can mean that there is a trend to use caesarean section as the 'solution' for every difficulty in labour. Some obstetric services in Africa and the Middle East have caesarean section rates that rival the developed world but OVB rates of less than 1%.<sup>5</sup> Asian countries have more varied practice and trends<sup>6</sup> (Table 1.1).

In the developing world, the problem of low public practice salaries means that most specialists survive on private practice income; however, it is difficult to run a successful private practice and at the same time be available to provide hands-on assistance for public hospital emergencies. Consequently, trainees often find themselves having to work things out for themselves: OVB is not a skill that is easy to work out by yourself. Therefore, after a couple of generations of little hands-on skills training in the labour ward, young obstetricians begin specialist practice with little training or experience in assisted birth and are therefore unable to instruct the next generation of trainees in this skill.

### **The Dr GC Bird legacy and the Papua New Guinea experience**

GC Bird trained in the UK and practiced obstetrics mostly in Kenya and Papua New Guinea. From 1968 to 1980, Dr Bird was Director of Obstetrics at the Port Moresby General Hospital in Papua New Guinea. In the early 1970s, he was involved in the first multicentre observational trials and graphing of cervical dilatation that led to the development of the partograph for the modern management of labour. During this period, Dr Bird became interested in the mechanics of assisted birth – he was one of the first to understand the importance of a flexing application of the vacuum cup to minimise failure with vacuum extraction.

Up to the 1960s, OVB was often employed to overcome minor degrees of cephalopelvic disproportion. With the forceps it is possible to exert quite extreme amounts of traction force: when this is excessive it is not uncommon that the infant sustains some birth trauma. The vacuum extractor, on the other hand, tends to detach when excessive traction force is applied. However, in the clinical scenario when there is 'tightness of fit' of the head in the pelvis, the vacuum extractor itself does not occupy any space in the pelvis, and by its first action in optimising flexion and correcting asynclitism it can overcome minor degrees of apparent disproportion without causing damage to either the woman or her baby.

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**Table 1.1** Comparison of differences in fertility, resource capacity and social issues that make the threshold for caesarean section low and spontaneous vaginal birth and operative vaginal birth more difficult to achieve between developing and developed countries

Issue	Developed country practice	Developing country practice
Total fertility rate	Low: most women have a desired family size of ~2	High: many women desire 4+ children
Client attitudes	Clients and families feel that they should be able to make decisions about obstetric care	Clients and families come to health professionals because they feel that they know what is best
Resources: human, equipment, drugs, logistics	Rarely do resource constraints impact on quality of midwifery care and obstetrical decision making	Midwifery care is often challenged and medical care needs to take resource constraints into account
Medico-legal factors	Perinatal factors commonly the subject of litigation if an outcome is not optimal	Most patients would not think of suing health staff as long as they considered that staff tried their best in the circumstances
Midwifery and support person views	Sometimes women are encouraged to not consider interventions even when a minor intervention early on could keep labour on a 'normal' track – leading to situations where a woman feels that CS is now the only 'reasonable option'	Midwives encourage women to believe that they can achieve a normal birth, but are happy to resort to sensible intervention when this would be beneficial
Society views	CS is as 'normal' as spontaneous birth or OVB	CS should only be performed if a woman cannot give birth to her baby safely: OVB is considered assistance to normal birth and not an 'operation'
Access to theatre and anaesthesia and blood, etc.	Available within the hour	May not be available at all or only after extended delay

CS = caesarean section; OVB = operative vaginal birth.

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Papua New Guinea, common to developing countries, has many remote villages where referral is difficult or impossible. For this reason it is logistically not possible for a woman to be referred to hospital when there is prolonged labour, and a caesarean scar may be a morbid handicap in subsequent pregnancies when there may be no access to antenatal or intrapartum care. For these reasons, the Papua New Guinea obstetric service has maintained a focus on effective vacuum extraction and keeping the caesarean section rate at around 5%. Over the past 40 years the rate of vacuum extraction failure at Port Moresby General Hospital has been steady at about 2.5%.<sup>7</sup>

### **OVB in low-resource countries**

#### *In the typical developing country labour ward where OVB is not commonly performed*

In Asia, assisted birth rates are mostly less than 5%,<sup>6</sup> and in Africa and South America the rates in big city hospitals are mostly only 1–2%.<sup>8,9</sup> Concomitantly, caesarean rates are as high (or higher) than in developed countries, sometimes with devastating consequences both contemporaneously (because of operative and anaesthetic risks) and in the longer term because of the scar in the uterus and the risks in the next pregnancy.

The only time that assisted birth is performed in these circumstances is when the head is on the perineum and the woman is unable to push it out despite an episiotomy being performed. In the 1990s there was a spate of papers published that lamented the loss of this obstetric skill;<sup>10</sup> however, by and large the situation has not changed much.

#### *Where operative vaginal birth is routinely performed when it is the best option to expedite birth*

There are parts of the developing world where OVB is performed as a reasonable alternative to prolonged expulsive efforts and caesarean section. It is often in church agency and rural district hospitals that OVB skills have been maintained, as well as some national sites (e.g. Port Moresby General Hospital), which have now become centres of excellence for OVB skills. There are other places such as Cambodia that have seriously taken on the World Health Organization (WHO) view that assisted vaginal birth is a 'comprehensive emergency obstetric care function'<sup>11,12</sup> and have made a national effort to improve and roll out training in OVB.

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In the developing world caesarean section can be quite dangerous for the woman not only in the current pregnancy because of surgical and anaesthetic difficulties, but also in subsequent pregnancies owing to the scar in her uterus, particularly if she is not assured of being able to access antenatal, labour and postnatal care in the next pregnancy (Table 1.2).

In the developing countries where operative obstetric skills have been maintained, operative vaginal birth is often carried out when there are concerns in terms of 'fit' (i.e. relative cephalopelvic disproportion). In these circumstances, unless there is a contraindication, labour is augmented when there is delay in the first (and second) stages and OVB will subsequently take place in the presence of caput and considerable moulding of the head. Epidural analgesia is mostly not available in developing countries. Moreover, there is a common view (both in the community and among maternity care professionals) that women are expected to 'push out their baby'. Under these circumstances practitioners make a concerted effort to avoid vacuum extraction failure by:

- augmenting contractions to maximise the three to four expulsive efforts of the procedure
- enlisting a midwife to encourage the woman to maximise her expulsive efforts for each of the tractions (and, in the author's opinion, sometimes exerting some fundal pressure with these efforts as well, when this is an acceptable part of intrapartum care – this would not be acceptable practice in the UK)
- the operator exerting as much traction as is safe to do.

In a trial situation, symphysiotomy may be used to complete OVB if the trial does not lead to satisfactory progress with the first several tractions.

In short, to minimise vacuum extraction failure and risk of scalp trauma, the message should be to maximise 'push' and minimise 'pull'.

## Training and skill attainment for OVB

### Historical training models and their advantages and disadvantages

Up to the 1970s it was common in many parts of the world for preservice trainees to be shown how to perform OVB as an 'elective' procedure, i.e. when the procedure was not fully indicated for clinical reasons, but for 'training purposes'. This style of training had the advantage of helping all trainees to

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**Table 1.2** Comparison between developed and developing countries in terms of the risks and benefits of caesarean section and vaginal birth (including operative vaginal birth)

<b>Caesarean section risk issues</b>	<b>Developed countries</b>	<b>Developing countries</b>
TFR Each birth increases the risk for a woman with a CS scar	TFR is commonly about 2	TFR is often 4+
Repeat CS	Elective repeat CS is often performed	Women will usually undergo trial of scar
Risk of placenta previa and abnormal placentation	Can be handled in most cases without serious morbidity or mortality risk	Placenta previa can be a life-threatening condition, and abnormal placentation has a very high mortality rate
Operative risks	Expertise is adequate and referral to more experienced practitioners for complications routine	Surgery may be performed by nonspecialists with limited experience, and there may be no access to experienced practitioners when complications develop
Anaesthetic and blood transfusion capacity	Anaesthetic expertise and adequate supplies of blood routinely available	Neither obstetrical anaesthetic expertise nor blood availability is routinely adequate
CS rates increase to high levels	Not a big problem	Can have a significant impact on the maternal mortality rate
Risks for subsequent pregnancies	Not commonly significant; only if abnormal placentation develops	If a woman cannot be assured of antenatal, and intrapartum care in the next pregnancy, a CS scar could be a 'death sentence'
Community expectations	CS is expected to be performed for every difficulty in labour	Most women and families expect women to give birth vaginally unless there is a serious problem

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become familiar with procedures; however, it suffers from the obvious disadvantage that the patient became a training 'resource', often without appropriate consent.

In the 1970s the 'see one, do one, teach one' mantra became a popular clinical training model. With complex procedures such as OVB, this can lead to poor outcomes and inadequate skill transfer. Bad habits formed in the 'do one' phase can also lead to passing on wrong messages in the 'teach one' phase.

A better model for OVB training might be termed the coaching model. This model starts with theoretical knowledge, moves on to observed clinical practice, then simulated practice on mannequins, and finally to direct supervision by the trainer in the clinical area. In fact, this is what is envisaged in the ROBuST training programme.

### **Skills training workshops, mannequins and on the job training**

Nowadays clinical skills workshops abound. There are skills training workshops available in ultrasound diagnosis, operative pelvic and laparoscopic surgery, colposcopy and other gynaecological procedures; skills training workshops in emergency and newborn care are many and varied too.

Recently, various mannequins have been produced to assist with emergency obstetric care skills training; these have differing merits and vary in terms of fidelity and resilience.

Sau et al.<sup>13</sup> asked the question 'Vacuum extraction: is there any need to improve the current training in the UK?' and, from the results of their paper, clearly the answer was a resounding 'yes'. Now is the time to put this into evidence-based practice.