The definition of shoulder dystocia and the incidence vary. Worldwide, shoulder dystocia may be increasing. In this update we look at the complications for both mother and fetus, and review the risk factors and strategies for possible prevention. Management options include the McRoberts position, techniques to deliver the anterior and posterior shoulder, and finally salvage manoeuvres, which include posterior axillary sling traction (PAST), the Zavanelli manoeuvre and fracture of the clavicles. In cases of fetal death associated with undelivered shoulder dystocia, one can consider the trans-abdominal performance or facilitation of traditional vaginal manoeuvres.

We suggest a simplified mnemonic, 'MAPS' – M: McRoberts, A: anterior shoulder, P: posterior shoulder, and S: salvage. A video teaching programme will be available shortly on the World Health Organization Reproductive Health Library (www.who.int/rhl; rhl@who.int).

One of the most dangerous predicaments confronting midwives, doctors and obstetricians is shoulder dystocia. Survival of the baby depends on staff being trained in the rapid performance of a range of clinical manoeuvres.

**Definition**

The American Society of Obstetricians and Gynecologists defines shoulder dystocia as a ‘delivery that requires additional obstetric manoeuvres following failure of gentle downward traction on the fetal head to effect delivery of the shoulders’.

The Royal College of Obstetricians and Gynaecologists defines shoulder dystocia as ‘a delivery that requires additional obstetric manoeuvres to release the shoulders after gentle downward traction has failed’.

Some clinicians use their own judgement to diagnose shoulder dystocia, and some divide shoulder dystocia into mild or severe depending on the number of manoeuvres needed to deliver the baby. Others use a head-to-delivery time with a cut-off of more than 60 seconds as a possible way of diagnosing shoulder dystocia and/or the necessity for ancillary obstetric manoeuvres.

**Incidence**

In the literature, the reported incidence varies from 0.2% to 3%. This large range may be due to the fact that there is no set definition for shoulder dystocia. The true incidence may actually be higher because it is not reported by doctors or midwives due to fear of litigation. Worldwide, shoulder dystocia may be increasing because women are having children at a later age and the rate of obesity is increasing.

**Complications**

Shoulder dystocia is associated with serious complications for both mother and baby.

Risks to the baby include contusions, lacerations, fractures of the humerus and clavicles, damage to the brachial plexus leading to nerve palsies, and hypoxia leading to cerebral palsy and even death. Cerebral palsy is associated with a prolonged head-to-shoulder delivery time. About 20% of babies delivered with shoulder dystocia will suffer some sort of injury. The severity of the injury depends on the time it takes to resolve the shoulder dystocia and the number of manoeuvres used.

The mother who delivers a baby with shoulder dystocia has an increased chance of sustaining perineal trauma, tears to the cervix, third- and fourth-degree perineal tears or episiotomies that extend. She may experience significant blood loss caused from bleeding from tears or uterine atony and may need a transfusion. There is also a
risk of developing postpartum infections. Other reported complications include postpartum bladder atony, lateral femoral nerve palsy, injury to the symphysis pubis and rarely uterine rupture.

**Risk factors**

**Macrosomia**

The term macrosomia describes a large baby, based on post-delivery weight. It cannot be diagnosed with certainty before delivery. Definitions use various cut-offs ranging from 4 000 g to 5 000 g. A large baby has an increased chance of developing shoulder dystocia, but trying to determine which babies are large is very difficult as estimations using the Leopold manoeuvres are inaccurate in assessing fetal weight, and ultrasound is no better. The American College of Obstetricians and Gynecologists bulletin on shoulder dystocia states that ultrasound has a sensitivity of only 22 - 44% and a positive predictive value of only 30 - 44% in predicting macrosomia. Most babies with a birth weight above 4 000 g that are delivered vaginally do not develop shoulder dystocia.

**Diabetes**

Babies born to diabetic mothers have an increased chance of developing shoulder dystocia, but macrosomia is as difficult to predict in diabetic mothers as it is in the non-diabetic population.

**Assisted delivery**

Several studies have shown that assisted deliveries have a higher rate of shoulder dystocia and a higher incidence of brachial plexus injury associated with shoulder dystocia.

**Previous shoulder dystocia**

The recurrent risk of shoulder dystocia is quoted as between 1.1% and 16.7% based on retrospective analyses. The Australian Carbohydrate Intolerance Study in Pregnant Women (ACHOIS trial) found no association between a previous birth complicated by shoulder dystocia and the risk of subsequent shoulder dystocia. The American College of Obstetricians and Gynecologists states that ‘because most subsequent deliveries will not be complicated by shoulder dystocia, the benefit of universal elective cesarean delivery is questionable in patients who have a history of shoulder dystocia’.

**Maternal weight, weight gain, age and multiparity**

An older mother is more likely to have an increased body mass index and is more likely to be multiparous. Whether these factors are independent risk factors or are risk factors due to the fact that they are in themselves risk factors for macrosomia is debatable. Bahar found no difference in the incidence of shoulder dystocia based on maternal age alone. The data linking maternal weight gain and fetal birth weight are controversial.

**Ethnicity**

African-American women have an increased risk of shoulder dystocia. This may be because they tend to have an android-shaped pelvis.

**Fetal presentation**

The occipitoposterior position has a protective effect for shoulder dystocia, but the risk of brachial plexus injury is increased in the setting of a persistent occipitoposterior delivery.

**Fetal gender**

Male babies are usually bigger than female babies, but there is no convincing evidence that the gender of the baby influences the incidence of shoulder dystocia.

**Post-date pregnancy**

Fetal growth continues, although at a slower rate, in the last few weeks of pregnancy. This may be a risk factor, as a larger baby has a higher chance of developing shoulder dystocia.

**Anaesthesia and oxytocin**

There is no reported relationship between the use of oxytocin or anaesthesia and shoulder dystocia.

**Labour abnormalities**

There is a reported higher incidence of shoulder dystocia when the second stage of labour is prolonged, but this may also be related to macrosomia. Shoulder dystocia is also thought to be more common in precipitous labour.

**Episiotomy**

The Royal College of Obstetricians and Gynaecologists states that episiotomy may not be necessary in all cases of shoulder dystocia. Dandolu et al. showed that a decrease in the use of episiotomy did not result in an increase in the occurrence of shoulder dystocia. Gurewitsch et al. found that in severe shoulder dystocia, if fetal manipulation can be performed without episiotomy, severe perineal trauma can be averted without incurring an increased greater risk of brachial plexus palsy.

**Experience**

Acker et al. found that the number of Erb’s palsies following shoulder dystocia deliveries did not vary with either the number of years a physician had been in practice or the number of deliveries that physician performed.

**Multiple risk factors**

The more risk factors present, the greater the chance of developing shoulder dystocia.
Prevention

Risk factors for shoulder dystocia have extremely poor positive predictive values, and it is therefore very difficult for the obstetrician, doctor or midwife to accurately and reliably predict it. A Cochrane review on the effects of prophylactic manoeuvres in preventing shoulder dystocia found no clear findings to support or refute their use. A screening tool called the CALM Shoulder Screen™ has been designed but is not commercially available yet.

Management

There is very little evidence to guide practice when dealing with shoulder dystocia. Randomised trials of strategies to prevent shoulder dystocia have found no evidence of benefit from labour induction for a woman with diabetes or for a suspected big baby, and shoulder dystocia is too rare and too unpredictable for prophylactic caesarean section to be of benefit.

The solution for shoulder dystocia is for all birth attendants to know how to manage the condition when it arises. The first step in managing this emergency is to diagnose shoulder dystocia and to call for help. Signs of possible shoulder dystocia include failure of the baby’s shoulders to deliver with the standard amount of maternal effort and moderate traction of the head, or the ‘turtle sign’ which occurs when the baby’s head is retracted back against the mother’s perineum.

Steps to manage the crisis should be taken calmly and quickly. The mother should be informed of the situation and encouraged to help actively. An assistant should record the times and manoeuvres attempted. Shoulder dystocia arises when the shoulders are too broad to pass through the pelvic outlet simultaneously, and fundal pressure alone or direct traction to the baby’s head does not help to deliver the shoulders and body. Several manoeuvres to overcome shoulder dystocia have evolved through clinical experience. One should move quickly through the manoeuvres if they are unsuccessful. The sequence in which they should be performed has never been systematically evaluated.

The McRoberts position is usually attempted first as it does not involve direct manipulation of the baby. The mother’s thighs are flexed towards her chest to tilt her pelvis forwards, thereby producing a significant cephalad rotation of the symphysis pubis and subsequent flattening of the sacrum. While encouraging the mother to bear down, pressure is applied above her pubic symphysis to push the baby’s anterior shoulder away from the midline and into the pelvis.

For delivery of the anterior shoulder, gentle posterior traction is applied to the baby’s head to help deliver the anterior shoulder while continuing suprapubic pressure. One must be aware of the risk of Erb’s palsy during this procedure as the brachial nerve plexus may be overstretched.

For the posterior shoulder, a hand is inserted in the posterior aspect of the vagina to reach the baby’s posterior arm, and the arm is swept across the baby’s chest and out. Menticoglou described another method for delivery of the posterior arm where traction is applied in the baby’s posterior axilla to bring the shoulder down with the right and left index fingers. The arm is then swept out as described above. Delivery of the anterior shoulder and body should follow easily.

Another option is to rotate the shoulders, with two fingers of one hand in front of the posterior shoulder and two fingers of the other hand behind the anterior shoulder. Slight rotation may provide space for delivery, otherwise continuous rotation for 180° so that the posterior shoulder emerges beneath the pubic symphysis may help. Rotating in the opposite direction may also be tried.

Recent reports have recommended that the first step taken to overcome shoulder dystocia should be attempts to deliver the posterior rather than the anterior shoulder. Rolling the mother onto all fours and repeating the above manoeuvres may also be effective, as this may alter the angle of the pelvis.

For severe shoulder dystocia that cannot be overcome by any of these methods, three salvage procedures have been described. These manoeuvres are posterior axillary sling traction (PAST), the Zavanelli manoeuvre, and fracture of the clavicles.

For posterior axillary sling traction—a, 12 or 14-gauge plastic suction catheter is folded over the tip of the operator’s index finger. It is then fed around the posterior axilla. The loop is retrieved with the other index finger and the catheter is pulled through. The ends are clamped or held and traction is applied to bring down the posterior shoulder. Once the posterior shoulder is low enough one hand is re-inserted to sweep down the posterior arm. Advantages to this procedure include the speed with which the shoulder dystocia can be resolved, the small amount of space occupied by the sling, and avoidance of maternal or fetal trauma. The risks to the baby have not been fully established, as this technique has only been used in a limited number of deliveries.

The second salvage method is the Zavanelli manoeuvre. The uterus needs to be relaxed with a tocolytic, and the baby’s head is then replaced in the vagina and a caesarean section performed. Despite published reports of high success rates with limited fetal ill-effects, one should be aware of adverse consequences, including neck trauma, associated with use of the manoeuvre. A modified Zavanelli manoeuvre has been described where the fetal head is partially reinserted in the vagina to dislodge the impacted shoulders and then the mother is encouraged to bear down to deliver the baby vaginally.

The third salvage method is to fracture one or both of the baby’s clavicles with direct finger pressure at the midpoint, thus reducing the breadth of the shoulders. There are very few reports of this technique actually being performed.
Shoulder dystocia is a rare but potentially disastrous obstetric emergency. It occurs when the baby’s shoulders fail to pass through the birth canal, often leading to injury and even death of the newborn. The etiology of shoulder dystocia is multifactorial, including maternal obesity, macrosomia, breech presentation, and fetal malposition. The management of shoulder dystocia is crucial and requires a multidisciplinary approach, including skilled birth attendants, immediate breech extraction, or even cesarean delivery in some cases.

Several mnemonics have been developed to help recall the steps involved in managing shoulder dystocia. A review of the literature reveals that the sequence of maneuvers can vary, and it is important for birth attendants to be familiar with multiple options to be prepared for any scenario. The mnemonic 'MAPS' (McRoberts, Anterior shoulder, P: posterior shoulder, S: salvage) is particularly useful, emphasizing the importance of a McRoberts maneuver followed by anterior shoulder delivery and salvage maneuvers if necessary.

In cases of fetal death associated with an undelivered shoulder dystocia, the trans-abdominal performance or facilitation of vaginal maneuvers can be considered. The PAST technique (P: posterior arm, A: anterior shoulder, S: salvage, T: traction on the fetal trunk) may be valuable as it avoids maternal surgery or destructive procedures. In cases of maternal tetanic contraction, the administration of intramuscular or intravenous magnesium sulfate can be effective.

Many complicated complications of shoulder dystocia have been described, including femur fractures, brachial plexus injuries, and even mortality. It is essential for birth attendants to be skilled in the whole range of maneuvers to manage this rare emergency calmly and with confidence. It is important to discuss management with the parents after delivery to review all cases of shoulder dystocia. Drills for shoulder dystocia are important in training staff on how to manage this acute emergency.

Many complicated mnemonics have been described to manage shoulder dystocia. We suggest a simplified mnemonic, ‘MAPS’: M: Mc Roberts, A: anterior shoulder, P: posterior shoulder, and S: salvage.

A video teaching programme demonstrating the manoeuvres used to overcome shoulder dystocia will shortly be available on the World Health Organization Reproductive Health Library (www.who.int/rhl, rhl@who.int).