Royal College of Obstetricians and Gynaecologists

Setting standards to improve women's health

SHOULDER DYSTOCIA

1. Background

Shoulder dystocia is defined as a delivery that requires additional obstetric manoeuvres to release the shoulders after gentle downward traction has failed.[1] Shoulder dystocia occurs when either the anterior or, less commonly, the posterior fetal shoulder impacts on the maternal symphysis or sacral promontory.

There is a wide variation in the reported incidence of shoulder dystocia but unselected population studies in North America and the UK found a 0.6% incidence.[2,3] There can be a high perinatal mortality and morbidity associated with the condition, even when it is managed appropriately.[3] Maternal morbidity is also increased, particularly postpartum haemorrhage (11%) and fourth-degree perineal tears (3.8%), and their incidence remains unchanged by the manoeuvres required to effect delivery.[4]

Brachial plexus injuries are one of the most important fetal complications of shoulder dystocia, complicating 4–16% of such deliveries.[3-5] This appears to be independent of operator experience.[6,7] Most cases resolve without permanent disability, with fewer than 10% resulting in permanent brachial plexus dysfunction.[8] In the UK, the incidence of brachial plexus injuries is 1/2300 live births.[9] Neonatal brachial plexus injury is the single most common cause for litigation related to shoulder dystocia.

Not all injuries are due to excess traction by the accoucheur[6] and there is now a significant body of evidence that maternal propulsive force may contribute to some of these injuries. Moreover, a substantial minority of brachial plexus injuries are not associated with clinically evident shoulder dystocia.[10] In one series, 4% of injuries occurred after a caesarean section.[11] Specifically, where there is Erb's palsy, it is important to determine whether the affected shoulder was anterior or posterior at the time of delivery, because damage to the plexus of the posterior shoulder is considered not due to action by the accoucheur.[12,13]

The Confidential Enquiries into Stillbirths and Deaths in Infancy's (CESDI) 5th annual report recommended 'a high level of awareness and training for all birth attendants'.[14] Annual skill drills, including shoulder dystocia, are recommended jointly by both the Royal College of Midwives (RCM) and the Royal College of Obstetricians and Gynaecologists (RCOG).[15]

2. Purpose and scope

The purpose of this guideline is to review the current evidence regarding the possible prediction, prevention and management of shoulder dystocia. It also provides some guidance for skill drills for the management of shoulder dystocia.

3.   Identification and assessment of evidence

Previous guidelines within this subject area were sought using the sites and gateways laid out in the RCOG clinical governance advice document, *Searching for Evidence*.[16] The Cochrane Library (including the Database of Systematic Reviews, DARE and the trials registry) and Medline were searched using a combination of MeSH terms and keywords.

The search was restricted to articles published in English between January 1980 and August 2004. Key words used in the literature search included: shoulder dystocia, macrosomia, McRoberts' manoeuvre, obstetric manoeuvres, complications of labour/delivery, brachial plexus injury, Erb's palsy, Klumpke's palsy, symphysiotomy, Zavanelli manoeuvre, skill drills, rehearsal of obstetric emergencies and medical simulation.

Reference lists of the articles identified were hand-searched for additional articles and some experts within the field were contacted. The levels of evidence and the grades of recommendations used in this guideline for effectiveness originate from the US Agency for Healthcare Research and Quality. Where possible, recommendations are based on, and explicitly linked to, the evidence that supports them. Owing to the emergency nature of the condition, most published series examining procedures for the management of shoulder dystocia are retrospective case series or case reports. Areas lacking evidence are annotated as 'good practice points'.

4.   Prediction

4.1   Can shoulder dystocia be predicted?

Risk assessments for the prediction of shoulder dystocia are insufficiently predictive to allow prevention of the large majority of cases.

`B`

A number of antenatal and intrapartum characteristics have been reported to be associated with shoulder dystocia (Table 1). There is a relationship between fetal size and shoulder dystocia[5] but it is not a good predictor. The large majority of infants with a birth weight of $\geq$4500 g do not develop shoulder dystocia[17] and, equally importantly, 48% of incidences of shoulder dystocia occur in infants with a birth weight less than 4000 g.[18] Moreover, clinical fetal weight estimation is unreliable and third-trimester ultrasound scans have at least a 10% margin for error for actual birth weight and a sensitivity of just 60% for macrosomia (over 4.5 kg).[19]

Evidence level III

Table 1	Factors associated with shoulder dystocia
Pre-labour	**Intrapartum**
Previous shoulder dystocia	Prolonged first stage of labour
Macrosomia	Secondary arrest
Diabetes mellitus	Prolonged second stage of labour
Maternal body mass index > 30 kg/m2	Oxytocin augmentation
Induction of labour	Assisted vaginal delivery

Statistical modelling has shown that these risk factors are not independent. Although statistically associated, these clinical characteristics have a low positive predictive value both singly and in combination.[20,21] Conventional risk factors predicted only 16% of shoulder dystocia that resulted in infant morbidity.[21] The large majority of cases occur in the children of women with no risk factors. Shoulder dystocia is, therefore, a largely unpredictable and unpreventable event.[18,22]

Evidence level III

Clinicians should be aware of existing risk factors but must always be alert to the possibility of shoulder dystocia with any delivery. ☑

5. Prevention

5.1 Management of suspected fetal macrosomia

Does induction of labour prevent shoulder dystocia?
There is no evidence to support induction of labour in women without diabetes at term where the fetus is thought to be macrosomic. `A`

There are a number of evidence-based reviews that have demonstrated that early induction of labour for women with suspected fetal macrosomia who do not have diabetes does not improve either maternal or fetal outcome.[23,24] *Evidence level Ia*

Induction of labour in women with diabetes mellitus does not reduce the maternal or neonatal morbidity of shoulder dystocia. `A`

A Cochrane review of elective delivery for women with diabetes concluded that induction of labour in women with diabetes treated with insulin reduces the risk of macrosomia.[25] There was a small decrease in the number of deliveries complicated by shoulder dystocia in the induction group[26] but the risk of maternal or neonatal morbidity was not modified. *Evidence level Ib*

Should elective caesarean section be recommended for suspected fetal macrosomia?
Elective caesarean section is not recommended to reduce the potential morbidity for pregnancies complicated by suspected fetal macrosomia without maternal diabetes mellitus. `C`

Elective caesarean section is not recommended for suspected fetal macrosomia (estimated fetal weight over 4.5 kg) without diabetes. Estimation of fetal weight is unreliable and the large majority of macrosomic infants do not experience shoulder dystocia.[17] In the USA, a decision analysis model estimated that an additional 2345 caesarean deliveries would be required, at a cost of US$4.9 million, to prevent one permanent injury from shoulder dystocia.[19] *Evidence level III*

There is some difficulty in grouping all fetuses with an expected weight of over 4.5 kg together: some fetuses will be much larger than this. The American College of Obstetricians and Gynecologists (ACOG) has recommended that an estimated fetal weight of over 5 kg should prompt consideration of delivery by caesarean section,[27] inaccuracy of methods of fetal size estimation notwithstanding. There are no data that directly support this recommendation. However, there is evidence to suggest that larger infants are more likely to suffer a permanent, rather than transient, brachial plexus injury after shoulder dystocia.[28] *Evidence level IV*

Elective caesarean section should be considered to reduce the potential morbidity for pregnancies complicated by suspected fetal macrosomia associated with maternal diabetes mellitus. `C`

Planned caesarean section should be considered for the small group of women with diabetes and suspected fetal macrosomia (estimated fetal weight greater than 4.5 kg).[19] ACOG has endorsed this recommendation in its most recent Clinical Management Guidelines.[27]

5.2 Previous shoulder dystocia

What is the appropriate mode of delivery after a previous episode of shoulder dystocia?

Either caesarean section or vaginal delivery is appropriate after a previous shoulder dystocia. The decision should be made by the woman and her carers.

☑

There is a reported recurrence rate of shoulder dystocia of between 1% and 16%.[18,22,29-32] However, this may be an underestimate owing to selection bias, as caesarean section may have been advocated for pregnancies after severe shoulder dystocia, particularly with a poor outcome.

Evidence level III

There is, therefore, no requirement to advise elective caesarean section routinely but factors such as the severity of any previous neonatal or maternal injury, fetal size and maternal choice should all be considered when offering recommendations for the next delivery.

6. Management

6.1 Intrapartum

What measures should be taken when shoulder dystocia is anticipated?

If shoulder dystocia is anticipated then some pre-emptive preparation may help.

☑

High-risk cases are those described in Table 1. An experienced obstetrician, that is one on the second tier of an on-call rota, should be available on the labour ward for the second stage of labour when shoulder dystocia is anticipated. However, it is recognised that not all cases can be anticipated and therefore all birth attendants should be conversant with the techniques required to facilitate delivery complicated by shoulder dystocia.

Evidence level IV

6.2 Delivery

How is shoulder dystocia diagnosed?

Routine traction in an axial direction may be employed to diagnose shoulder dystocia.

☑

Routine traction is defined as 'that traction required for delivery of the shoulders in a normal vaginal delivery where there is no difficulty with the shoulders'.33 Evidence from cadaver studies suggests that lateral and downward traction is more likely to cause nerve avulsion33 and therefore this should be avoided in the management of shoulder dystocia. Timely management of shoulder dystocia requires prompt recognition. The attendant health-carer should routinely observe for:

Evidence level IV

- difficulty with delivery of the face and chin
- the head remaining tightly applied to the vulva or even retracting
- failure of restitution of the fetal head
- failure of the shoulders to descend.

The use of the McRoberts' manoeuvre compared with the lithotomy position (Figure 1) before clinical diagnosis of shoulder dystocia does not appear to reduce the traction force on the fetal head during vaginal delivery in multiparous women. Therefore its use cannot be recommended to prevent shoulder dystocia.[34]

Evidence level Ib

Figure 1. The McRoberts' manoeuvre (from the SaFE Study)

How should shoulder dystocia be managed?

Shoulder dystocia should be managed systematically.

☑

The CESDI report on shoulder dystocia identified that 47% of the babies died within 5 minutes of the head being delivered.[14] It is important, therefore, to manage the problem as efficiently as possible but also carefully: efficiently so as to avoid hypoxia acidosis, carefully so as to avoid unnecessary trauma.

Evidence level III

Immediately after recognition of shoulder dystocia, extra help should be called.

☑

Help should be summoned immediately. In a hospital setting, this should include further midwifery assistance, an obstetrician, a paediatric resuscitation team and an anaesthetist.[35] Maternal pushing should be discouraged, as this may lead to further impaction of the shoulders, thereby exacerbating the situation.[36] The woman should be manoeuvred to bring the buttocks to the edge of the bed.

Evidence level IV

Fundal pressure should not be employed.

C

Fundal pressure should not be used for the treatment of shoulder dystocia.[14] It is associated with an unacceptably high neonatal complication rate and may result in uterine rupture.[21]

Evidence level IV

Episiotomy is not necessary for all cases.

B

Some authors have advocated that episiotomy is an essential part of the management in all cases[37] but others suggest that it does not affect the outcome of shoulder dystocia.[38] The authors of one study have concluded that episiotomy does not decrease the risk of brachial plexus injury with shoulder dystocia.[39]

Evidence level III

The Managing Obstetric Emergencies and Trauma (MOET) Group suggests a selective approach, reserving episiotomy to facilitate manoeuvres such as delivery of the posterior arm or internal rotation of the shoulders.[40] An episiotomy should therefore be considered but it is not mandatory.

Evidence level IV

McRoberts' manoeuvre is the single most effective intervention and should be performed first.

B

The McRoberts' manoeuvre (Figure 1) is flexion and abduction of the maternal hips, positioning the maternal thighs on her abdomen.[41,42] It straightens the lumbo-sacral angle, rotates the maternal pelvis cephalad[4] and is associated with an increase in uterine pressure and amplitude of contractions.[43] The McRoberts' manoeuvre is the single most effective intervention, with reported success rates as high as 90%.[4,44-46] It has a low rate of complication and therefore should be employed first.

Evidence level III

Suprapubic pressure is useful.

C
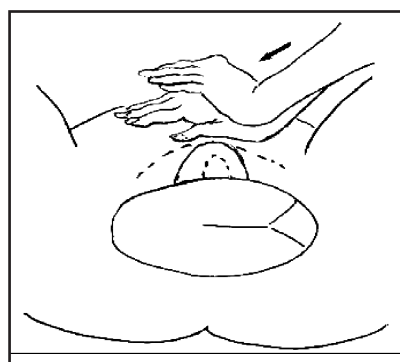
Suprapubic pressure can be employed together with McRoberts' manoeuvre to improve success rates.[4] Suprapubic pressure reduces the bisacromial diameter and rotates the anterior shoulder into the oblique pelvic diameter. The shoulder is then free to slip underneath the symphysis pubis with the aid of routine traction.[45] External

Evidence level IV

Figure 2. Suprapubic pressure (from SaFE Study)

suprapubic pressure is applied in a downward and lateral direction to push the posterior aspect of the anterior shoulder towards the fetal chest (Figure 2). It is advised that this is applied for 30 seconds. There is no clear difference in efficacy between continuous pressure or 'rocking' movement.

Evidence level IV

Advanced manoeuvres should be used if the McRoberts' manoeuvre and suprapubic pressure fail.

☑

If these simple measures (the McRoberts' manoeuvre and suprapubic pressure) fail, then there is a choice to be made between the all-fours-position and internal manipulation. Traditionally, internal manipulations are used at this point but the-all-fours position has been described, with an 83% success rate in one case series.[47] The individual circumstances should guide the accoucheur. For a slim mobile woman without epidural anaesthesia and with a single midwifery attendant, the all-fours-position is probably the most appropriate. For a less mobile woman with epidural anaesthesia in place and a senior obstetrician in attendance, internal manoeuvres are more appropriate.

Evidence level III

There is no advantage between delivery of the posterior arm and internal rotation manoeuvres and therefore clinical judgement and experience can be used to decide their order.
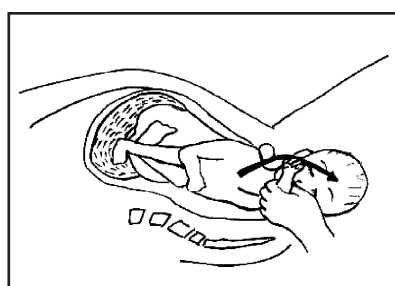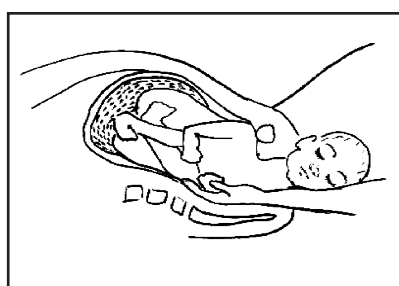
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Figure 3.
Delivery of the posterior arm
(from the SaFE tudy)

Delivery of the fetal shoulders may be facilitated by rotation into an oblique diameter or by a full 180-degree rotation of the fetal trunk.[48,49] Delivery may also be facilitated by delivery of the posterior arm (Figure 3).[50] The fetal trunk will either follow directly or the arm can be used to rotate the fetal trunk to facilitate delivery. Delivery of the posterior arm has a high complication rate: 12% humeral fractures in one series,[3] but the neonatal trauma may be a reflection of the refractory nature of the case, rather than the procedure itself.[44] Some authors favour delivery of the posterior arm,[46] particularly where the mother is large.[51]

Evidence level III

There are no comparative studies available and therefore the accoucheur should base their decision on their training and clinical experience and the prevailing circumstances.

6.3   Persistent failure of first- and second-line manoeuvres

What measures should be taken if first- and second-line manoeuvres fail?
Third-line manoeuvres require careful consideration to avoid unnecessary maternal morbidity and mortality.

☑

It is difficult to recommend a time limit for the management of shoulder dystocia, as there are no conclusive data available.

Several third-line methods have been described for those cases resistant to all simple measures. These include cleidotomy (bending the clavicle with a finger or surgical division), symphysiotomy (dividing the symphyseal ligament) and the Zavanelli manoeuvre. It is rare that these are required.

Cephalic replacement of the head, or the Zavanelli manoeuvre, and delivery by caesarean section has been described[52] but success rates vary.[53] Intuitively, the Zavanelli manoeuvre may be most appropriate for rare bilateral shoulder dystocia, where both the shoulders impact on the pelvic inlet, anteriorly above the pubic symphysis and posteriorly on the sacral promontory. The maternal safety of this procedure is unknown, however, and this should be borne in mind, knowing that a high proportion of fetuses have irreversible hypoxia-acidosis by this stage. Evidence level III

Evidence level III

Similarly, symphysiotomy has been suggested as a potentially useful procedure, both in the developing[54,55] and developed[56] world. However, there is a high incidence of serious maternal morbidity and poor neonatal outcome.[57] Consideration should be given to these facts, particularly if training has not been received.

After delivery, the birth attendants should be alert to the possibility of postpartum haemorrhage and third- and fourth-degree perineal tears.

✓

7.   Risk management

7.1   Rehearsal

What measures can be taken to ensure optimal management of shoulder dystocia?
Training for all birth attendants in the management of shoulder dystocia is recommended by the Royal College of Midwives and RCOG.

✓

The fifth CESDI report recommended that a 'high level of awareness and training for all birth attendants' should be observed.[14] Annual 'skill drills', including shoulder dystocia, are recommended jointly by both the RCM and the RCOG.[15] These drills are also now one of the requirements in the new Maternity Clinical Negligence Scheme for Trusts (CNST) standards.[58] The optimal frequency of rehearsals is not known. Evidence level IVyg

Evidence level IV

A systematic review of skills training in the UK, however, concluded that there was little evidence available and therefore it was difficult to demonstrate a benefit of training.[59] More recently, Deering demonstrated that training with a simulation-training scenario improved resident performance in the management of shoulder dystocia.[60] Moreover, training with a mannequin which provides force feedback may reduce the peak force used by the accoucheur during simulated delivery.[61] Evidence level III

Evidence level III

Table 2	The HELPERR mnemonic
H	Call for help
E	Evaluate for episiotomy
L	Legs (the McRoberts' manoeuvre)
P	Suprapubic pressure
E	Enter manoeuvres (internal rotation)
R	Remove the posterior arm
R	Roll the patient

Local training should include a systematic approach to shoulder dystocia. There are a number of suggestions to aid this, such as the HELPERR mnemonic from American Life Support Organisation (Table 2). A simple, practical approach currently being tested for the Department of Health Proof of Principle study of the effect of individual and team drill on the ability of labour ward staff to manage acute obstetric emergencies SaFE

Evidence level IV

study is as below. Rehearsal can often be accommodated locally in delivery rooms62 using mannequins or the ubiquitous doll and pelvis. It is probably useful to demonstrate the manoeuvres in direct view, as they are complex and difficult to understand by description alone.

7.2 Documentation

How can successful litigation be avoided when shoulder dystocia occurs?
Accurate documentation of a difficult and potentially traumatic delivery is essential.

☑

The sixth CESDI annual report highlighted inadequate documentation in obstetrics, with potential medico-legal consequences.[63] It may be helpful to use a structured pro forma to aid accurate record keeping. An example is provided in Appendix II.

It is important to record:

- the time of delivery of the head
- the direction the head is facing after restitution
- the manoeuvres performed, their timing and sequence
- the time of delivery of the body
- the staff in attendance and the time they arrived
- the condition of the baby (Apgar score)
- umbilical cord blood acid-base measurements.

It is particularly important to document the position of the fetal head at delivery as this permits identification of the anterior and posterior shoulders during the delivery.

7.3 Auditable standards

- Critical analysis of manoeuvres used in the management of shoulder dystocia.
- Documentation of the event (see above).
- Proportion of babies born with a brachial plexus injury.
- Staff attendance at shoulder dystocia training programmes.
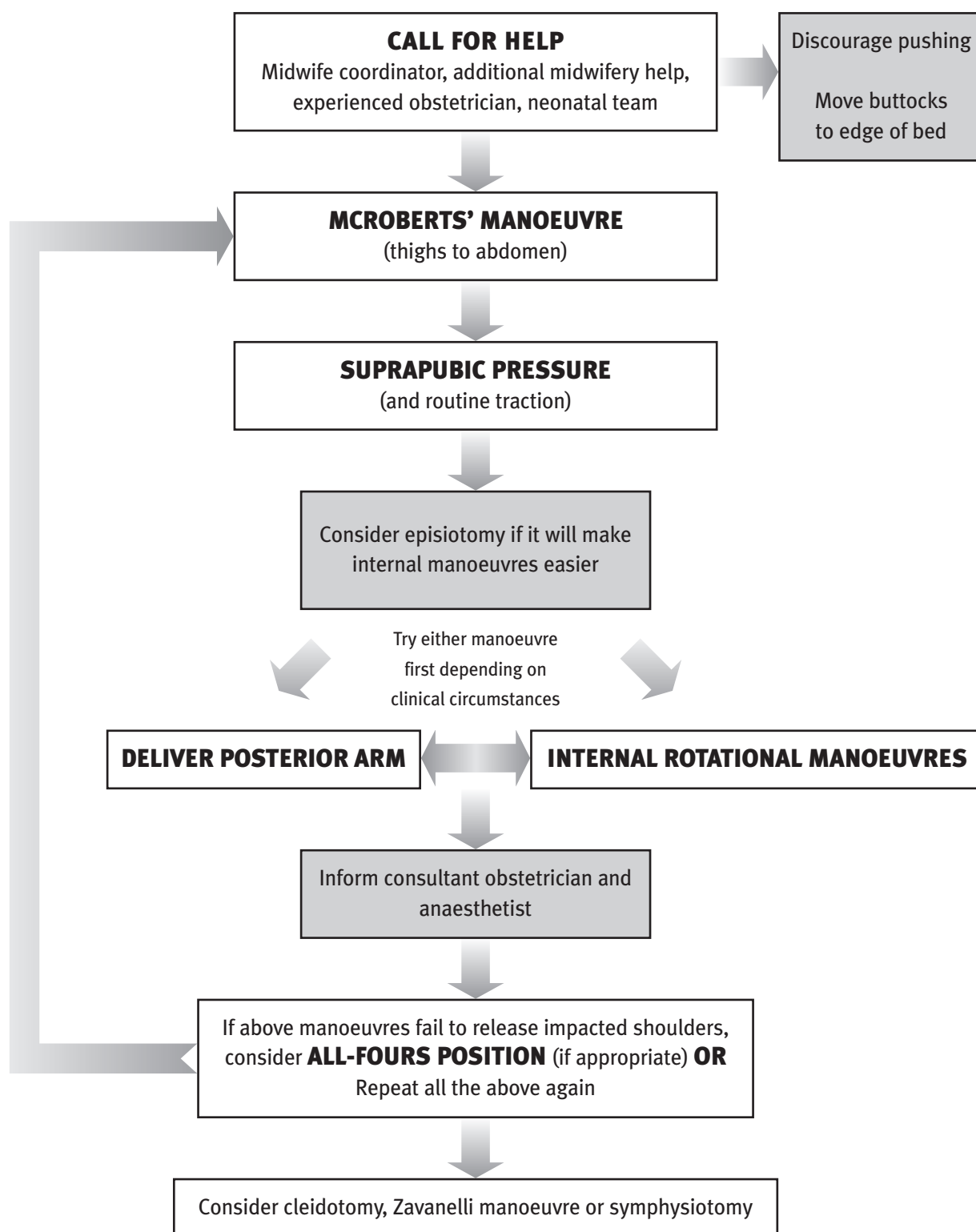
8. Support

The Erb's Palsy Group (www.erbspalsygroup.co.uk) provides an excellent support network for children and their families.

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APPENDIX I: Algorithm for the management of shoulder dystocia

CALL FOR HELP
Midwife coordinator, additional midwifery help,
experienced obstetrician, neonatal team

Discourage pushing

Move buttocks
to edge of bed

MCROBERTS' MANOEUVRE
(thighs to abdomen)

SUPRAPUBIC PRESSURE
(and routine traction)

Consider episiotomy if it will make
internal manoeuvres easier

Try either manoeuvre
first depending on
clinical circumstances

DELIVER POSTERIOR ARM ↔ **INTERNAL ROTATIONAL MANOEUVRES**

Inform consultant obstetrician and
anaesthetist

If above manoeuvres fail to release impacted shoulders,
consider **ALL-FOURS POSITION** (if appropriate) **OR**
Repeat all the above again

Consider cleidotomy, Zavanelli manoeuvre or symphysiotomy

Baby to be reviewed by neonatologist
DOCUMENT ON PRO FORMA AND COMPLETE CLINICAL INCIDENT REPORTING FORM

APPENDIX II: Example reporting form

SHOULDER DYSTOCIA

Date ....

Delivery of head   Spontaneous ☐   Instrumental ☐

Registrar called   Yes ☐   No ☐   Time Registrar called.............. Arrived ....

Senior midwife called   Yes ☐   No ☐   Time .... Arrived ....

Paediatrician called   Yes ☐   No ☐   Time .... Arrived ....

PROCEDURE USED TO ASSIST DELIVERY OF THE SHOULDERS

	Tick	Order	Time	Performed by (print name)
McRoberts' manoeuvre	☐	☐	....	....
Suprapubic pressure and routine traction*	☐	☐	....	....
Evaluation for episiotomy (reason if not performed)	☐	☐	....	....
Episiotomy	☐	☐	....	....
Delivery of posterior arm	☐	☐	....	....
Wood screw manoeuvre	☐	☐	....	....
Mother on all fours/other	☐	☐	....	....

Time of delivery of head ....   **Time of delivery of body** ....

At Delivery: Head facing mother's Left ☐   **Head facing mother's right** ☐

FETAL CONDITION

Weight ....**kg**   **Apgar**   1 minute ☐   5 minutes ☐   10 minutes ☐

Cord pH: Arterial .... Venous..............
Paediatric assessment at delivery...
....
....

* Routine traction refers to the traction required for delivery of the shoulders in a normal vaginal delivery where there is no difficulty with the shoulders.

Signed... Print name..

APPENDIX III

Clinical guidelines are: 'systematically developed statements which assist clinicians and patients in making decisions about appropriate treatment for specific conditions'. Each guideline is systematically developed using a standardised methodology. Exact details of this process can be found in Clinical Governance Advice No. 1: *Guidance for the Development of RCOG Green-top Guidelines* (available on the RCOG website at www.rcog.org.uk). These recommendations are not intended to dictate an exclusive course of management or treatment. They must be evaluated with reference to individual patient needs, resources and limitations unique to the institution and variations in local populations. It is hoped that this process of local ownership will help to incorporate these guidelines into routine practice. Attention is drawn to areas of clinical uncertainty where further research may be indicated.

The evidence used in this guideline was graded using the scheme below and the recommendations formulated in a similar fashion with a standardised grading scheme.

Classification of evidence levels	Grades of recommendations
Ia Evidence obtained from meta-analysis of randomised controlled trials.	**A** Requires at least one randomised controlled trial as part of a body of literature of overall good quality and consistency addressing the specific recommendation. (Evidence levels Ia, Ib)
Ib Evidence obtained from at least one randomised controlled trial.	
IIa Evidence obtained from at least one well-designed controlled study without randomisation.	**B** Requires the availability of well controlled clinical studies but no randomised clinical trials on the topic of recommendations. (Evidence levels IIa, IIb, III)
IIb Evidence obtained from at least one other type of well-designed quasi-experimental study.	**C** Requires evidence obtained from expert committee reports or opinions and/or clinical experiences of respected authorities. Indicates an absence of directly applicable clinical studies of good quality. (Evidence level IV)
III Evidence obtained from well-designed non-experimental descriptive studies, such as comparative studies, correlation studies and case studies.	**Good practice point**
IV Evidence obtained from expert committee reports or opinions and/or clinical experience of respected authorities.	✓ Recommended best practice based on the clinical experience of the guideline development group.

Valid until December 2008
unless otherwise indicated