

Training for obstetric emergencies: PROMPT and shoulder dystocia

Katie Cornthwaite
Joanna Crofts
Tim Draycott
Dimitrios Siassakos
Cathy Winter

Southmead Hospital, Bristol UK
University of Bristol, UK

Introduction

Shoulder dystocia is an unpredictable and therefore largely unpreventable emergency complication of vaginal birth. Shoulder dystocia is associated with risks to both mother and baby, particularly injury to the fetal brachial plexus. Effective, multi-professional team working is essential for the successful management of shoulder dystocia and although some training has been demonstrated to improve neonatal outcomes, there is conflicting evidence of effect. The Royal College of Obstetrics and Gynaecology (RCOG) guideline¹ recognises that, in line with the PROMPT programme: *‘Shoulder dystocia training associated with improvements in clinical management and neonatal outcomes was multi-professional, with manoeuvres demonstrated and practiced on a high fidelity mannequin. Teaching used the RCOG algorithm (Box 1) rather than staff being taught mnemonics (e.g. HELPERR) or eponyms (e.g. Rubin’s and Woods’ screw)’*.

What is shoulder dystocia?

Shoulder dystocia is defined as a vaginal birth that requires additional manoeuvres to deliver the baby after routine traction fails to release the shoulders.² Most commonly, the anterior fetal shoulder impacts on the maternal symphysis pubis preventing birth of the body.

The reported incidence of shoulder dystocia is variable, estimated at between 0.58% and 0.70% in the largest studies.³⁻⁹ Whilst relatively uncommon, shoulder dystocia has been associated with both poor neonatal outcomes⁵ and increased maternal morbidity; some of which is preventable. This preventable morbidity accounted for 5% of the successful litigation in a recent NHSLA review.¹⁰

What are the consequences of shoulder dystocia?

Maternal

Shoulder dystocia can be frightening for staff¹¹ and parents¹² especially where there is poor communication between staff and the mother. Moreover, shoulder dystocia is associated with an increased risk of postpartum haemorrhage as well as third and fourth degree tears.²

Neonatal

Delay between delivery of the fetal head and body can lead to cord compression and fetal hypoxia. Whilst a healthy fetus will initially compensate, as the head to body delivery interval increases, the risk of severe acidosis and development of hypoxic ischaemic encephalopathy increases. If the fetus is in a good condition before birth, the risk of significant hypoxic injury is small when the head to body delivery interval is less than 5 minutes.^{13,14}

The most important neonatal complication is brachial plexus injury. It has been estimated that 1 in 2300 births in the UK are affected by a permanent brachial plexus injury.¹⁵

- Erb’s palsy is the most common form of brachial plexus injury; the infant is unable to abduct or externally rotate the arm, or supinate the forearm, resulting in a classic ‘waiter’s tip’ appearance. Fortunately, up to 90% of Erb’s palsies recover by 12 months of age.¹⁶
- Klumpke’s palsy, a lower brachial plexus injury, is less common. This results in a limp hand and the infant being unable to move the fingers. The recovery rate of this injury is much lower, with around 40% resolving by 12 months.¹⁶

- In approximately 20% of brachial plexus injuries, there is complete paralysis of the arm with total sensory and motor deficit. This may also be associated with Horner's syndrome, in which there is permanent pupillary constriction, ptosis of the eyelid and anhidrosis of the affected side.¹⁷

Shoulder dystocia can also result in humeral and clavicular fractures, which usually heal quickly with no long-term consequence.

Can we predict shoulder dystocia?

Whilst several antenatal and intrapartum characteristics have been reported to be associated with shoulder dystocia, the majority of cases occur in women with no risk factors.¹⁴

Shoulder dystocia in a previous birth particularly increases the risk of shoulder dystocia, with rates reported to be 10 times higher than the rate in the general population.¹⁸

Macrosomia, maternal diabetes mellitus and obesity, and operative vaginal birth are all associated with increased risk of shoulder dystocia. However, even a combination of risk factors is poorly predictive.^{9,19} Therefore maternity staff should be alert to the possibility of shoulder dystocia in all vaginal births and be ready to expedite the birth with accurate management if shoulder dystocia occurs.

Although it is accepted that shoulder dystocia can be prevented by caesarean section; it has been estimated that an additional 2345 caesarean births would be required to prevent one permanent injury from shoulder dystocia.²⁰ Accordingly, in both the American Congress of

Obstetricians and Gynecologists (ACOG) and RCOG guidance,²¹ elective caesarean section is only recommended for women with diabetes and suspected fetal macrosomia (>4.5kg), or where the estimated fetal weight is greater than 5kg in mothers who are not diabetic.

Multi-professional training for obstetric emergencies

Obstetric emergencies, including shoulder dystocia, require a rapid and coordinated response from several members of the multi-professional team. Although training for shoulder dystocia typically focuses on the individual skills of the accoucheur, effective multi-professional team working remains essential. Training individuals, rather than teams, may lead to the omission of critical steps.²²

Although it is not possible to prevent shoulder dystocia during vaginal birth; accurate management can significantly reduce complications²³⁻²⁶ and training for shoulder dystocia has been recommended for nearly 20 years.²⁷

Training is important; shoulder dystocia is uncommon and reductions in working hours mean that staff are even less likely to see this complication. In addition, the manoeuvres are difficult to learn experientially. However, the literature on the effect of training is conflicting; some training for shoulder dystocia has been associated with no clinical effect²⁸ and some training has even been shown to increase poor outcomes.¹⁵ However, there are also examples of successful training.²³⁻²⁶ At least one author has recognised that practice does not make perfect, if it is the wrong practice.²⁹ Therefore, understanding the underlying concepts and training in the manual skills required to release the shoulders are essential.³⁰

Until recently, doctors and midwives attended separate training programmes. This failed to utilise the variety of skills and knowledge provided by the different team members and only served to exacerbate inter-professional barriers. The priority for training should be improved clinical outcomes and patient safety. However, training should also be a non-threatening, enjoyable, and beneficial experience for staff. Multi-professional training should avoid being hierarchical, encourage contribution from all team members and promote positive attitudes. This not only improves communication and safety, but also fosters a more pleasant working environment^{22, 31} and may also reduce midwifery sick leave.

However, not all multi-professional training works. Whilst the majority of studies have shown improvements in clinical outcomes, a number have been associated with either no improvement or even an increase in perinatal morbidity.^{15,32,33} Conversely, training using the established PROMPT (PRactical Obstetric Multi-Professional Training) programme has been shown to improve outcomes for women in Bristol to an extent that ranks it amongst one of the best examples in world literature,³⁴⁻³⁶ and it is now spreading globally.

PROMPT is an evidence-based training intervention intended to improve maternal and perinatal care. Evidence from the Simulation and Fire-drill Evaluation (SaFE) study conducted across the South West of England demonstrated improved knowledge,³⁷ skills³⁸ and team working³⁹ in staff following shoulder dystocia training. More importantly direct improvements in neonatal outcomes following multi-professional shoulder dystocia training have been demonstrated. In the first four

years of training at Southmead Hospital in Bristol there was a 70% reduction in neonatal injury following the introduction of training to manage shoulder dystocia.²⁵ A decade of embedded training later, Southmead Hospital has just reported no permanent brachial plexus injuries in 561 cases of shoulder dystocia.⁴⁰ Similar results have been replicated in the USA.²⁶

PROMPT involves low cost, high fidelity simulation training, which is designed to optimise multi-professional team working. It bridges the gap between theory and real-life, providing hands-on practical training. To more accurately reflect real life, individuals train within their usual professional role and training takes place 'in-house'. This is not only cost-effective, but allows staff members, who work together, to train together to improve real-life outcomes.^{25, 34} Local training allows staff to familiarise themselves with their environment and helps maternity units to identify any local safety problems. PROMPT does not require the use of complex and expensive technology, but rather advocates patient actors⁴¹ and basic props to increase realism. Nonetheless, training of technical skills such as internal manoeuvres at shoulder dystocia can benefit from high-technology simulators such as the PROMPT Birthing Trainer (Limbs & Things) for shoulder dystocia.³⁷

PROMPT training also provides an opportunity to implement and disseminate evidence-based guidelines,³⁵ by encouraging the use of management algorithms, such as the RCOG shoulder dystocia algorithm, and documentation proforma. These tools not only help to standardise practice, but also guide staff to undertake the correct actions; making the right way, the easy way.⁴²



Demonstrating McRoberts' position



Supra-pubic pressure



Teaching hand position for internal manoeuvres (Pringles manoeuvre)



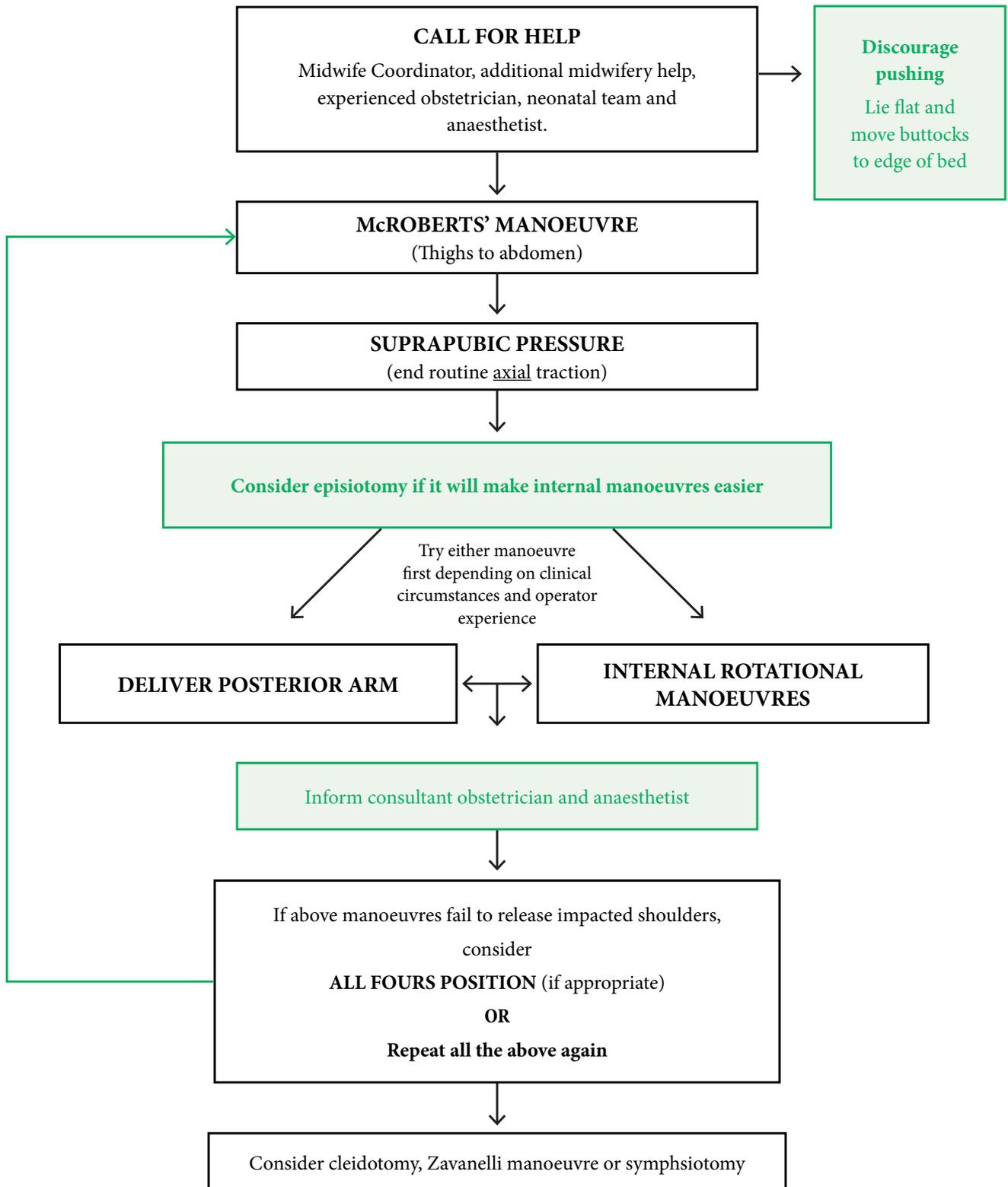
Grasping the wrist of baby's posterior arm to facilitate release of the shoulders

Conclusion

Shoulder dystocia is an unpredictable, acutely life-threatening obstetric emergency, with significant risk of harm to the infant if managed inappropriately. Effective and sustainable multi-professional training is crucial in reducing these risks and improving maternity care and safety.

The PROMPT programme has resulted in significant improvements in reducing preventable harm following shoulder dystocia, particularly permanent neonatal brachial plexus injury.

BOX 1: Algorithm for the management of shoulder dystocia



Baby to be reviewed by neonatologist after birth and referred for Consultant Neonatal review if any concerns
DOCUMENT ALL ACTIONS ON PROFORMA AND COMPLETE CLINICAL INCIDENT REPORTING FORM.

References

1. Shoulder Dystocia. 2nd ed. RCOG; 2012 Mar pp. 1–18.
2. Gherman RB. Shoulder dystocia: an evidence-based evaluation of the obstetric nightmare. *Clin Obstet Gynecol.* 2002 Jun;45(2):345–62.
3. McFarland M, Hod M, Piper JM, Xenakis EM, Langer O. Are labor abnormalities more common in shoulder dystocia? *Am J Obstet Gynecol.* 1995 Oct;173(4):1211–4.
4. Baskett TF, Allen AC. Perinatal Implications of Shoulder Dystocia. *Obstet Gynecol.* 1995 Jul 1;86(1):14.
5. German RB, Ouzounian JG, Goodwin TM. Obstetric maneuvers for shoulder dystocia and associated fetal morbidity. *Am J Obstet Gynecol.* 1998 Jun;178(6):1126–30.
6. McFarland MB, Langer O, Piper JM, Berks MD. Perinatal outcome and the type and number of maneuvers in shoulder dystocia. *International Journal of Gynecology & Obstetrics.* 1996 Dec;55(3):219–24.
7. Ouzounian JG, Gherman RB. Shoulder dystocia: Are historic risk factors reliable predictors? *Am J Obstet Gynecol.* 2005 Jun;192(6):1933–5.
8. Smith RB, Lane C, Pearson JF. Shoulder dystocia: what happens at the next delivery? *BJOG: An International Journal of Obstetrics & Gynaecology.* Blackwell Publishing Ltd; 1994 Aug 1;101(8):713–5.
9. Nesbitt TS, Gilbert WM, Herrchen B. Shoulder dystocia and associated risk factors with macrosomic infants born in California. *Am J Obstet Gynecol.* 1998 Aug;179(2):476–80.
10. Ten Years of Maternity Claims. NHS Litigation Authority; 2012 Oct pp. 1–171.
11. Dahlen. What do midwives fear? 2014 Dec;27(4):266–70.
12. Hinton. Partner Experiences of “Near-Miss” Events in Pregnancy and Childbirth in the UK: A Qualitative Study. 2014 Apr 9;9(4):e91735.
13. Leung TY, Stuart O, Sahota DS, Suen S, Lau TK, Lao TT. Head-to-body delivery interval and risk of fetal acidosis and hypoxic ischaemic encephalopathy in shoulder dystocia: a retrospective review. *BJOG: An International Journal of Obstetrics & Gynaecology.* Blackwell Publishing Ltd; 2011 Mar 1;118(4):474–9.
14. Lerner. Relationship Between Head-to-Body Delivery Interval in Shoulder Dystocia and Neonatal Depression. 2011 Aug;118(2, Part 1):318–22.
15. MacKenzie IZ, Shah M, Lean K, Dutton S, Newdick H, Tucker DE. Management of Shoulder Dystocia: Trends in Incidence and Maternal and Neonatal Morbidity. *Obstet Gynecol.* 2007 Nov 1;110(5):1059–68.
16. Doumouchtsis SK. Is it possible to reduce obstetrical brachial plexus palsy by optimal management of shoulder dystocia? 2010 Sep;1205:135–43.
17. Semel-Concepcion J et al, Neonatal Brachial Plexus Palsies, Medscape, Jan 2009
18. Mehta SH, Blackwell SC, Chadha R, Sokol RJ. Shoulder dystocia and the next delivery: Outcomes and management. <http://dxdoi.org/101080/14767050701563826>. Informa UK Ltd UK; 2009 Jul 7.
19. Bahar AM. Risk factors and fetal outcome in cases of shoulder dystocia compared with normal deliveries of a similar birthweight. *BJOG: An International Journal of Obstetrics & Gynaecology.* Blackwell Publishing Ltd; 1996 Sep 1;103(9):868–72.
20. Rouse DJ, Owen J. Prophylactic cesarean delivery for fetal macrosomia diagnosed by means of ultrasonography—A Faustian bargain? *Am J Obstet Gynecol.* 1999.
21. Shoulder Dystocia: Comparison of the ACOG Practice Bulletin with Another National Guideline. 2010;27(2):129–36.
22. Siassakos D, Crofts JF, Winter C, Weiner CP, Draycott TJ. The active components of effective training in obstetric emergencies. *BJOG: An International Journal of Obstetrics & Gynaecology.* Blackwell Publishing Ltd; 2009 Jul 1;116(8):1028–32.

23. Grobman WA. Outcomes associated with introduction of a shoulder dystocia protocol. 2011 Dec;205(6):513–7.
24. Inglis SR. Effects of shoulder dystocia training on the incidence of brachial plexus injury. 2011 Feb 24;:1–6.
25. Draycott TJ, Crofts JF, Ash JP, Wilson LV, Yard E, Sibanda T, et al. Improving Neonatal Outcome Through Practical Shoulder Dystocia Training. *Obstet Gynecol*. 2008 Jul 1;112(1):14–20.
26. Weiner C. 61: 5-year experience with PROMPT (PRACTICAL Obstetric Multidisciplinary Training) reveals sustained and progressive improvements in obstetric outcomes at a US hospital. Elsevier; 2014 Jan 1;210(1):S40.
27. CESDI 5th Report (SD). 1999 Jan 6;:1–109.
28. Walsh JM. Neonatal brachial plexus injury: comparison of incidence and antecedents between 2 decades. 2011 Apr;204(4):324.e1–6.
29. Satin AJ. Perfecting practice. 2008 Oct 1;112(4):746–7.
30. Crofts JF, Fox R, Ellis D, Winter C, Hinshaw K, Draycott TJ. Observations From 450 Shoulder Dystocia Simulations: Lessons for Skills Training. *Obstet Gynecol*. 2008 Oct 1;112(4):906
31. Sexton JB, Holzmueller CG, Pronovost PJ, Thomas EJ, McFerran S, Nunes J, et al. Variation in caregiver perceptions of teamwork climate in labor and delivery units. *Journal of Perinatology*. Nature Publishing Group; 2006 Aug 1;26(8):463–70.
32. Nielsen PE, Goldman MB, Mann S, Shapiro DE, Marcus RG, Pratt SD. Effects of teamwork training on adverse outcomes and process of care in labor and delivery: a randomized controlled trial. *Obstet Gynecol* 2007;109(1):48–55.
33. Markova V, Sørensen JL, Holm C, Nørgaard A, Langhoff-Roos J. Evaluation of multi-professional obstetric skills training for postpartum hemorrhage. *Acta Obstet Gynecol Scand* 2012;91(3):346–52.
34. Siassakos D, Hasafa Z, Sibanda T, Fox R, Donald F, Winter C, et al. Retrospective cohort study of diagnosis–delivery interval with umbilical cord prolapse: the effect of team training. *BJOG: An International Journal of Obstetrics & Gynaecology*. Blackwell Publishing Ltd; 2009 Jul 1;116(8):1089–96.
35. Draycott TJ, Sibanda T, Owen L, Akande V, Winter C, Reading S. Does training in obstetric emergencies improve neonatal outcome? *BJOG* 2006;113(2):177–82.
36. Scholefield H. Embedding quality improvement and patient safety at liverpool Women's NHS Foundation Trust. *Best Pract Res Clin Obstet Gynaecol* 2007;21(4):593–607.
37. Crofts J, Ellis D, Draycott T, Winter C, Hunt L, Akande V. Change in knowledge of midwives and obstetricians following obstetric emergency training: a randomised controlled trial of local hospital, simulation centre and teamwork training. *BJOG: An International Journal of Obstetrics and Gynaecology* 2007;114(12):1534–41.
38. Crofts JF, Bartlett C, Ellis D, Hunt LP, Fox R, Draycott TJ. Training for shoulder dystocia: a trial of simulation using low-fidelity and high-fidelity mannequins. *Obstet Gynecol* 2006;108(6):1477–85.
39. Siassakos D, Fox R, Crofts JF, Hunt LP, Winter C, Draycott TJ. The management of a simulated emergency: better teamwork, better performance. *Resuscitation* 2011;82(2):203–06.
40. Crofts J, Lenguerrand E, Bentham G, Tawfik S, Claireaux H, Odd D, et al. Prevention of brachial plexus injury-12 years of shoulder dystocia training: an interrupted time-series study. *Bjog* 2015;17(10):1471–0528.
41. Crofts JF, Bartlett C, Ellis D, Winter C, Donald F, Hunt LP, et al. Patient-actor perception of care: a comparison of obstetric emergency training using manikins and patient-actors. *Qual Saf Health Care*. BMJ Publishing Group Ltd; 2008 Feb 1;17(1):20–4.
42. Sibanda T, Sibanda N, Siassakos D, Sivananthan S, Robinson Z, Winter C, et al. Prospective evaluation of a continuous monitoring and quality-improvement system for reducing adverse neonatal outcomes. *Am J Obstet Gynecol*. 2009 Nov;201(5):480.e1–480.e6.