

Editorial

The Possible ‘Time-Distortion Effect’ in a Normal Birth Complicated by Shoulder Dystocia: Novel Insights

Dimitrios Papoutsis^{1,2,*}, Paraskevi Klazoglou¹, George Valasoulis^{1,3}¹Department of Midwifery, School of Health Sciences, University of Western Macedonia, 50200 Ptolemaida, Greece²Department of Obstetrics and Gynaecology, Shrewsbury and Telford Hospitals NHS Trust, TF16TF Telford, UK³Department of Obstetrics and Gynaecology, Medical School, University of Thessaly, 41500 Larissa, Greece*Correspondence: dpapoutsis@uowm.gr (Dimitrios Papoutsis)

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The National Institute for Health and Care Excellence (NICE) in 2014 suggested the criteria as to when a pregnancy should be regarded as low risk or high risk for potential complications. According to these recommendations, approximately 1 in 2 women are considered low risk for complications [1]. Nevertheless, approximately 30% of women considered to be at low risk have the potential to develop an unexpected complication during or after delivery that will require a necessary intervention [2]. The World Health Organization reports that in all women irrespective of their risk status, approximately 15% will develop complications serious enough to require a rapid and skilled intervention if they or their baby are to survive without lifelong disabilities [3].

A complication that may occur unexpectedly even in the absence of risk factors that may have severe neonatal morbidity and mortality if not managed timely and properly is the occurrence of shoulder dystocia [4]. Shoulder dystocia is defined as a vaginal delivery that requires additional obstetric maneuvers to deliver the fetus after the head has been delivered and gentle traction has failed to deliver the shoulders and body. It is considered a bone-to-bone impaction of the anterior fetal shoulder behind the pubis symphysis of the maternal pelvis [4]. It is considered an obstetric emergency as there is limited blood supply to the fetus due to compression of the umbilical cord by the pelvic side walls. This can lead to significant brain hypoxia and if the fetus is not delivered timely, death may occur [5]. If death does not occur, then brachial plexus injury is one of the most serious and frequent fetal complications of shoulder dystocia [6]. There is a wide variation in the reported incidence of shoulder dystocia with certain studies reporting incidences between 0.58% and 0.70%. In a baby weighing more than 4500 g, shoulder dystocia may occur in 20% of infants [4].

Based on the literature, shoulder dystocia is known as one of the most traumatic birth experiences for both women and midwives [7]. It is among the top three traumatic and stressful birth experiences for midwives in the United States of America and one of the most feared emergencies at childbirth in Australia. A systematic review found that almost

13% of midwives feel traumatized when witnessing a traumatic birth and 35% may experience post-traumatic stress disorder [8]. Furthermore, their mental health may be adversely affected and this may lead to burnout and excessive emotional fatigue.

All these reports and systematic reviews have addressed the aftermath of shoulder dystocia describing how midwives coped after the stressful event and none have measured or explored what happens at the moment shoulder dystocia occurs. It is well known that ‘*time does matter*’ in an obstetric emergency with reports on shoulder dystocia demonstrating that 47% of the babies that died did so if the head-to-delivery time exceeded 5 minutes [5]. Moreover, most simulation training programs related to obstetric emergencies require that each maneuver used to manage shoulder dystocia should last 30 seconds before escalating to the next maneuver [9].

The question therefore that arises is whether the birth attendant of a normal vaginal delivery that is unexpectedly complicated by shoulder dystocia manages at that very moment of emergency to retain the perception of time despite the panic, or whether a ‘*time-distortion effect*’ as defined by the American Psychological Association [10] is initiated as a response to the acute stress. The time-distortion effect essentially means that there is either a ‘*slowing-down*’ of time as perceived by the birth attendant which may lead to a time delay in promptly and orderly performing the necessary maneuvers to facilitate delivery with a resulting brain hypoxia and neonatal death, or a ‘*speeding-up*’ of time which may lead to iatrogenic harm to the neonate because of aggravated and improperly rushed maneuvers. In either case, there is the potential for a significant detrimental impact on the neonatal outcome.

In the field of social sciences and neurosciences, the ‘time-distortion’ effect has been extensively studied [11]. Even though the neural mechanisms of time perception are not fully understood, the loss of sense of time passing has been described in several psychiatric and neurological disorders, and has also been reported in cases of acute and extreme stress [12]. There are many theoretical models of timing that have been postulated to explain time perception in



an individual, but most suggest that we possess an internal neural and psychological clock that may be altered in response to various stimuli, with no consistent direction of the time-distortion identified in terms of under-estimation or over-estimation of time [11,13].

When shoulder dystocia occurs, the birth attendant needs to perform a specific set of maneuvers in a prompt and proper way so as to dislodge the impacted fetal shoulder. The National Health Service (NHS) Litigation Authority in England has reported that 46% of neonatal injuries related to shoulder dystocia were associated with substandard care implying that the staff involved did not apply these maneuvers correctly. When mistakes are made in the maneuvers to resolve shoulder dystocia, this in turn adds more actual time to the management of the case and aggravates further the stress of the birth attendant. A study from the field of neuroscience has reported that after making a mistake, we tend to respond more slowly in the next round, and this might be because the brain in its error processing and post-error adjustments is trying to give itself more time to avoid making the same mistake [14]. Since errors in the performance of maneuvers have been documented in the stressful condition of shoulder dystocia, it is highly likely that this ‘slowing-down’ of the actual and perceived time may specifically exist in the management of shoulder dystocia. It remains to be proven if this anticipated time-distortion effect can be modified by a better performance of maneuvers and by making less mistakes through regular training on shoulder dystocia.

There are occasions when shoulder dystocia is due to a large-sized baby, which poses extreme difficulty in performing the required maneuvers. This adds time to the course of necessary actions and as the birth attendant is getting closer to the five-minute limit of severe fetal brain hypoxia and damage, then stress and anxiety increases. There is a report from the field of psychology stating that when a threatening stimulus is forthcoming, then there is an increase in the arousal and anxiety levels which speeds up our neural timing system. The study further reported that the temporal over-estimation is greater when the expectation for the forthcoming threatening event has a longer time duration [15]. In other words, the longer it takes to manage shoulder dystocia, the greater the ‘slowing-down’ of time should be anticipated as the five-minute threshold of delivery is rapidly approaching.

There seems to be a gap in the literature with no relevant obstetric studies at present exploring such a ‘time-distortion effect’ in the event of shoulder dystocia. If this phenomenon is indeed present during shoulder dystocia, we are currently unaware of its prevalence and its magnitude. Further research is required to clarify these new insights. Studies should initially attempt to measure the actual time from diagnosis of shoulder dystocia to successful delivery, and subsequently record the time perceived by the birth attendant to achieve a successful delivery. The only available measure to mitigate the likely harmful effects of the possi-

ble time-distortion during shoulder dystocia at childbirth is to encourage regular simulation training of midwives and obstetricians, as this has clearly been shown to improve outcomes and performance [16]. Moreover, it is prudent to have an independent observer in the role of an objective time-keeper who will document and notify the birth attendant managing the shoulder dystocia as to when the time limits have been exceeded or whether the maneuvers are performed in a rapid manner that may be harmful to the neonate [17].

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DP wrote the first draft, reviewed, adjusted, and edited the final manuscript. PK and GV participated in the literature search. All authors read and approved the final manuscript.

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References

- [1] National Collaborating Centre for Women’s and Children’s Health (UK). Intrapartum Care: Care of Healthy Women and Their Babies During Childbirth. 2014.
- [2] Danilack VA, Nunes AP, Phipps MG. Unexpected complications of low-risk pregnancies in the United States. *American Journal of Obstetrics and Gynecology*. 2015; 212: 809.e1–809.e6.
- [3] AbouZahr C. Maternal mortality overview. In Murray, C.J.L., Lopez, A. (eds) *Health dimensions of sex and reproduction: the global burden of sexually transmitted diseases, HIV, maternal conditions, perinatal disorders, and congenital anomalies*. Harvard School of Public Health: Cambridge, MA. 1998.
- [4] Royal College of Obstetricians Gynaecologists (RCOG). Green top-guideline No. 42. Shoulder dystocia. 2012. Available at: http://rcog.org.uk/media/ewgpnmio/gtg_42.pdf (Accessed: 5 August 2023).
- [5] Focus group: shoulder dystocia. In Confidential Enquiry Into Stillbirths and Deaths in Infancy (CESDI) 5th Annual Report. Maternal and Child Health Research Consortium: London (United Kingdom). 1998; 73–79.
- [6] Mendez-Figueroa H, Hoffman MK, Grantz KL, Blackwell SC, Reddy UM, Chauhan SP. Shoulder dystocia and composite ad-

- verse outcomes for the maternal-neonatal dyad. *American Journal of Obstetrics & Gynecology MFM*. 2021; 3: 100359.
- [7] Minooee S, Cummins A, Foureur M, Travaglia J. Shoulder dystocia: A panic station or an opportunity for post-traumatic growth? *Midwifery*. 2021; 101: 103044.
- [8] Aydın R, Aktaş S. Midwives' experiences of traumatic births: A systematic review and meta-synthesis. *European Journal of Midwifery*. 2021; 5: 31.
- [9] Shoulder Dystocia. In Winters, C., Crofts, J., Laxton, C., Barnfield, S., Draycott, T. (eds) *PROMPT Course Manual* (pp. 147–168). 2nd edn. Cambridge University Press: Cambridge. 2012.
- [10] American Psychological Association. *APA Dictionary of Psychology*. 2nd edn. 2015. Available at: <https://dictionary.apa.org/time-Distortion> (Accessed: 5 August 2023).
- [11] van Hedger K, Necka EA, Barakzai AK, Norman GJ. The influence of social stress on time perception and psychophysiological reactivity. *Psychophysiology*. 2017; 54: 706–712.
- [12] Fontes R, Ribeiro J, Gupta DS, Machado D, Lopes-Júnior F, Magalhães F, *et al.* Time Perception Mechanisms at Central Nervous System. *Neurology International*. 2016; 8: 5939.
- [13] Fung BJ, Sutlief E, Hussain Shuler MG. Dopamine and the interdependency of time perception and reward. *Neuroscience and Biobehavioral Reviews*. 2021; 125: 380–391.
- [14] Overbye K, Walhovd KB, Paus T, Fjell AM, Huster RJ, Tamnes CK. Error processing in the adolescent brain: Age-related differences in electrophysiology, behavioral adaptation, and brain morphology. *Developmental Cognitive Neuroscience*. 2019; 38: 100665.
- [15] Droit-Volet S, Mermillod M, Cocenas-Silva R, Gil S. The effect of expectancy of a threatening event on time perception in human adults. *Emotion*. 2010; 10: 908–914.
- [16] Dahlberg J, Nelson M, Dahlgren MA, Blomberg M. Ten years of simulation-based shoulder dystocia training- impact on obstetric outcome, clinical management, staff confidence, and the pedagogical practice - a time series study. *BMC Pregnancy and Childbirth*. 2018; 18: 361.
- [17] Baxley EG, Gobbo RW. Shoulder dystocia. *American Family Physician*. 2004; 69: 1707–1714.