

Head to Shoulder Interval in 92 Cases Normal Birth with Good Baby Condition by Two Step Shoulder Delivery Method

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Abstract

Purpose of investigation: Observation of natural process of head to shoulder interval by waiting for at least one contraction (two-step method) after head delivered in normal birth.

Method: From 1st to the end of mar. In 2015 at Haikou maternal and child hospital in China, women in vaginal delivery meet the criteria were recorded by video from head crown to shoulder and to body delivered. 92 cases normal vaginal birth with normal baby condition were recorded, video tapes were transfer to computer then replayed and observed. Interval of head crown to head delivery and head to shoulder delivery, babies' activities during birth were recorded from video at same time.

Result: 1. The mean time of head to shoulder interval by waiting for a contraction is (71.043 ± 61.015) sec, mean +2 Std. = 193.073 sec, 95% CI (15.65-229.15) sec.

2. 55.43 % (51/92) percent interval of head to shoulder were less than 60 sec, 39.1% (36/92) were over 60sec and less than 190 sec. 5.4 % (5/92) over 190 sec.

3. 71.734% (66/92) shoulders were emerged from perineum, 15.217% (14/92) transversely, 13.04% (12/92) emerged from under pubic.

4. 22 % percent babies breathed before shoulder delivery, some after, some did not cry at all, but had normal heartbeat and breath Patten.

Conclusion: 1. Head to shoulder delivery interval is longer than 60 sec by two step method of shoulder delivery. The majority shoulders emerged from perineum rather from under pubic. 96.73% (89/92) cases shoulders were delivered at the first contraction after head delivered, only 3.27% (3/92) cases had delivered by twice contractions.

2. Babies activities during delivery of shoulder included breath, making faces, sucking, bubble from noses and mouth, and the color of the face, all those signs indicated the normal live birth.

Keywords: Head to shoulder interval; Two-step method of shoulder delivery; One-step method of shoulder delivery; Neonatal asphyxia; Normal birth; Shoulder dystocia

Introduction

The tension in labor room rises when the head of fetus is delivered, to waiting or to pull, the debate over one-step and two-step method of shoulder delivery exists and continues. The physiological mechanism of baby rotation after the head delivered is that, the baby first goes restitution, then external rotation and whole body delivered, the process of external rotation is the time window of head to shoulder interval. Providers were advised to wait for a contraction, not to push or pull, instead, allowing the shoulder necessary time to rotate; this is so called two step method of shoulder delivery [1]. As commanded by Hart in 1997, by waiting for a contraction after head delivered, the incidence of shoulder dystocia were reduced dramatically [2]. Where

One-step method described by Welch, was a corresponding letter to the editors, but no data to support this method so far [3].

How long should we wait, that is a puzzling question. As Spong [4] defined the 60s of interval head to body as objective standard of shoulder dystocia, concern of asphyxia with every second passing puts heavy pressure on medical workers in field. But by Locatelli A' study which allowed the shoulders to deliver in two-step, the mean head-to-body interval was 88s ± 61s [5]. The relationship of interval of head to shoulder and baby asphyxia was controversial. Locatelli A5 stated although head-to-body interval was significantly correlated to umbilical artery pH (p = 0.02), but not of clinically significant (0.0078 units for every additional minute of the interval). Stallings study reported that Head-to-body delivery intervals (available for 44 cases) were not associated with statistically significant alterations in umbilical artery pH, increasing head-to-body delivery interval was also not significantly correlated with decreasing 5-minute Apgar score [6].

Two-step method of shoulder delivery is natural way of delivery, while one-step is an intervention invented by human being in attempt to fasten the delivery yet without grounded scientific evidence. As recommend by WHO normal birth guideline, any intervention in normal birth should be adjusted with solid evidence [7]. What is the normal range from head to shoulder by waiting for shoulder to delivery naturally, that what this study aimed to resolve.

The hypothesis of this study is that the interval of head to shoulder by natural way of delivery (two step) in normal birth with good neonate condition may be longer than 60 sec. we conduct the study by video tape recording the interval from head crown till the shoulder and baby delivered and observe the condition of delivery by exam the real time video tape.

Material and Method

Objectives

Observation study was conducted during March in 2015 in Haikou maternal and child hospital in China, 92 cases of normal birth by two step method delivery were recorded by video tape. Patient consent forms were signed. The study was proved by ethical committee of hospital.

Enrollment criteria:

- (1) Women in vaginal delivery with singleton, cephalic presenting, at 36 or more weeks of gestation
- (2) No severe maternal complications such as diabetes, hypertension, heart disease, anemia, etc.
- (3) Natural process of labor, no augmentation with oxytocin or receiving of anesthesia
- (4) Fetus condition is stable during labor [4] women agreed to join in the study

Exclusive criteria: (1) women conduct cesarean section (2) twine, breach, forceps delivery (3) women had any severe complication during pregnant (4) unsure fetus condition as heartbeat lower than 100bpm lasting 1 minute or longer, too tight cord around neck at birth, heavy bleeding at birth or postpartum period, or babies' face turn black or pale after the head delivered (5) women or family members refuse to take part in.

Study design: Real time video was recorded at site from crown of head to shoulder and whole body delivered using phone camera.

Women were allowed to be free of movement during labor and delivery. Women were allowed to delivery in whatever position they preferred, on side, on hands-and-knees, or supine. All cases did not have episiotomy and anesthesia pain relief. Maternal age, parity, birth weight and Apgar score of neonates were recorded in form.

Perineum was protected by allowing the women in modified breathing over the contraction (hand-off). After head delivered, women were asked to continue long exhalation over the shoulder delivery, shoulders were delivered by the natural force of the uterus contraction, and no man force was applied.

When there had any emergence situation, as too tight cord around neck, or the faces of babies turned to black or pale, and the heartbeat of fetus was lower than 100 BPM, emergence care would be taken immediately by caregivers in clinical setting.

Measurement: Video tapes were observed by transferring to computer.

Interval of head crown to head delivery was recorded from crown to the head of the fetus emerged from the perineum, head to shoulder interval was timed from head emerged to either shoulder emerged from perineum or pubic, the fetus condition was assisted by color of face, heartbeat, face movement, breath or cry activities.

Statistic analysis: The SPSS package (16.0) was used to undertake the analysis. The student's t-test was applied to compare indicators of the time of head crown, head to shoulder and neonatal birth weight. Results were expressed as mean standard deviation. Correlation analysis was applied for interval of head to shoulder and birth weight. A P value 0.05 was considered as significant, and all inferential tests were two-tailed.

		crowntohead	headtoshoulder
N	Valid	92	92
	Missing	1	1
Mean		149.3370	71.0435
Std. Deviation		158.14455	61.01539
Skewness		2.061	2.129
Std. Error of Skewness		.251	.251
Minimum		5.00	5.00
Maximum		919.00	355.00
Percentiles	5	13.6000	15.6500
	95	450.7500	229.1500

Figure 1: Distribution of interval from crown to head to shoulder.

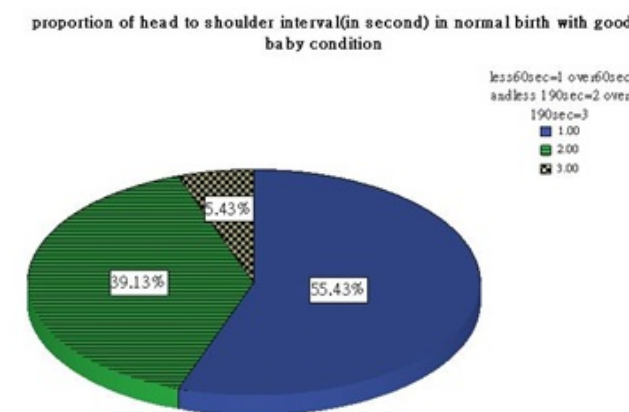


Figure 2: Proportion of interval from head to shoulder.

Results

General information

92 cases were recorded, 67 cases were nulliparous. Mean age of women is 24.242 ± 3.122 year. All shoulders were delivered naturally without additional maneuver of caregivers. No maternal severe complication as postpartum hemorrhage occurred; 92 cases were live birth, all babies had good condition of Apgar score over 8 at birth and survived at one month follow up, had 100% percent breastfeeding at 1 month. No baby had send to NICU or receiving medical treatment.

31.5% (29/92) had cord around neck, 80.43% (74/92) had intact perineum, 18.47% (17/92) were first degree laceration, one case (1.080%, 1/92) second degree laceration, no third and fourth degree laceration. No episiotomy applied and no case had baby injury of any kind.

Interval of crown to head and head to shoulder

The mean interval of crown to head delivery is (149 ± 158.144) sec, mean $+2^*$ std.= 465.625 sec; 95% CI (13.600-450.750) sec.

The mean interval of head to shoulder delivery is (71.043 ± 61.015) sec, Mean $+2^*$ std. from head delivery to shoulder delivery is 193.073 sec. 95% CI (15.650-229.150) sec.

The test of homogeneity of variances of crown to head is 2.500 ($p=0.08$), of head to shoulder is 11.145 ($p=0.000$) (Figure 1).

Proportion of head to shoulder interval

55.43 % (51/92) percent interval of head to shoulder were less than 60 sec, 39.1% (36/92) were over 60sec and less than 190 sec. 5.4% (5/92) over 190 sec (Figure 2).

Maternal and neonate condition between those less 60 sec and over had no statistic significant. No baby depression occurred in this study (Table 1).

	≤ 60 seconds (n=51)	60 seconds(n=41)	t	P
Maternal age (y)	30.627 ± 5.122	29.634 ± 4.608	0.966	0.336
Gestational age (wk)	38.607 ± 1.662	38.561 ± 2.086	0.12	0.905
Crown to head (sec)	138.274 ± 162.716	163.097 ± 153.137	0.746	0.457
Head to shoulder(sec)	32.509 ± 13.950	118.975 ± 63.072	9.517	0
Birth weight (g)	3254.511 ± 321.537	3234.472 ± 475.586	0.226	0.822
Apgar score (at 1min)	$9.843 \pm .504$	$9.951 \pm .218$	1.277	0.205

Table 1: Maternal and neonate condition between interval of head to shoulder less and over 60 seconds.

Shoulder delivery style

From video, we could see exactly how the shoulders were delivered.

75% (69 /92) shoulders were delivered within the first contraction of uterus after head delivered, 3.26% (3/92) had delivered at twice contractions, which the shoulder emerged from perineum at the first contraction but returned to vaginal again, then delivered at next contraction. This phenomenon had never been described previously; we name it as "shoulder visible on vulvar gapping".

Contrary to the ordinary belief, 71.734% (66/92) shoulder emerged from perineum, 15.217% (14/92) transversely, 13.04% (12/92) emerged from under pubic (Figure 3).

Neonate activities during delivery

92 babies had Apgar score over 8 at birth, and had not received emergence resuscitation and no baby had transferred to NICU, all babies survived well at 1 month follow up.

22% (20/92) babies cried before the shoulder were completely delivered, among them 10 babies cried before shoulder delivery, 10 cases during the delivery to chest, 62% (57/92) cried after birth, 16% did not cry after birth, but with normal skin color and normal breathe and heartbeat. All babies had normal Patten of live signs and no baby had sent to NICU (Figure 4).



Figure 3: Shoulder emerged from perineum.

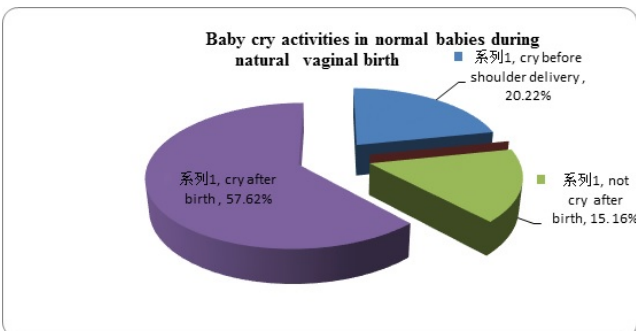


Figure 4: Baby cry activities at birth.

Discussion

Some experts recommended delivering the shoulder in one-step manner by gentle pulling downward the neck of the fetus once the head is delivered, in an attempt to fasten the delivery of baby 3, which was recognized as routine practice in clinical setting of China. But the incidence of shoulder dystocia and associated brachial plexus injury have not changed over time, and even rising, despite the fact that more effort have paid on the training of shoulder dystocia maneuver and more liberal using of cesarean section [8].

We had to follow the natural print and to follow the right way for better outcomes. At the very begin, we had to know what is normal process of baby delivery, how the shoulder rotates and deliver and how long the interval is when it is safe for fetus. This study opened a fresh new option to this puzzle.

The interval of crown to delivery

The mean interval from crown to head delivery is 149 sec \pm 158.144 sec, mean $+2^{\circ}$ std.= 465.625 sec; 95% CI (13.600-450.750) sec. This result is similar to Spong' study, in which from crown to delivery was (190 \pm 22.1) sec in primiparas and (111.9 \pm 13.3) sec in multiparas. We see no difference between parity in this study. From the study, we found no relationship between interval of head to shoulder in line with birth weight, that result contradicted to the result of Spong 3, He found lower newborn's weight in those normal group than those prolonged interval group. Since it is a pilot study with small sample, further observation is needed.

The interval of head to shoulder in normal birth may longer than 60 sec

55.43% (51/92) percent interval of head to shoulder were less than 60 sec, 39.1% (36/92) were over 60 sec and less than 190 sec 5.4% (5/92) over 190 sec. The mean interval of head to shoulder delivery is 71.043 sec \pm 61.015 sec, Mean $+2^{\circ}$ std. of head delivery to shoulder delivery is 193.073 sec. 95% CI (15.650-229.150) sec.

The longest interval of head to shoulder in this study was 355 sec. but this baby was born spontaneously without any maneuver of man force, the baby was in normal condition. That fact questions the definition of shoulder dystocia over 60s and also questions the justice of clinical diagnosis of shoulder dystocia. When babies delivered by uterus force without additional maneuver and no adverse maternal and neonatal event occur, those births should be defined as normal birth not shoulder dystocia (thought the interval of head to shoulder may be longer than 60 sec).

From this study, we can conclude that the interval of head to shoulder in normal birth by two step method is longer than 60 sec.

Waiting for one contraction

In one step method of shoulder delivery, shoulders were expected to emerge under pubic bone. So gentle downward force where applied in an attempt to help the baby born. By waiting for the shoulder delivered by uterus contraction, we have found that the majority of shoulder emerged from perineum, or transversely in vaginal, not from pubic. From this study, we can conclude that downward force to deliver the shoulder under pubic is not necessary and even not the right direction. In natural birth, natural process should be put to the first consideration; help will be reserved when it is necessary.

In this study 96.73% (89/92) cases shoulders were delivered at the first contraction after head delivered, only 3.27% (3/92) cases had delivered by twice contractions. That fact offered a clue that caution should be given when the shoulder did not delivered at the first contraction. we see an interesting phenomenon that similar to head visible at vulvar gapping (that before the crown of head, the head will return to vaginal after the contraction and emerged again and bigger), In those 3 cases with twice contractions we can see that the shoulder were emerged from vulvar and return to vaginal, we named it "shoulder visible on vulvar gapping". That indicated the shoulder take

effort to descent and come out the same as head visible to crown and delivery (though it is much shorter than that from head visible to crown but it does take time). Attention should be paid to and preparation for shoulder dystocia should be put in mind, but action may be delayed by carefully assessment of the fetus condition. Fortunately, all babies born naturally in this study, if the second contraction failed to deliver the shoulder, further action as Gaskin' (on your fours) may be tried and whatever maneuvers feasible be applied [9].

Assessment of baby condition while waiting for the contraction

The main concern about the process of shoulder delivery is the condition of the babies. Care giver may be in great tension with every second passing. Thought the reported evidence about the interval of head to shoulder related to baby asphyxia was controversial. Leung et al. [10] study found a statistically significant, albeit small, correlation between head-to-body delivery interval and umbilical artery pH ($r = -0.210$, $P = 0.003$) and umbilical artery base excess ($r = 0.144$, $P = 0.045$). If the head-body delivery interval was less than 5 minutes, the risk of severe acidosis-pH less than 7.0-was 0.5%, whereas this risk was 5.9% when the delivery interval was 5 minutes or greater In study by Lerner [8], a positive relationship was observed between increasing length of delivery interval and neonatal depression, the percentage of neonate with depression rose sharply after 3 minutes from another hand, as indicated by same author, even the shortest interval included some neonate with depression. Zanardo [11] reported that pH values significantly lower (7.31 ± 0.09 vs 7.33 ± 0.06 , $p = 0.003$) in 'two-step' VD (vaginal delivery) neonates than in CS (cesarean section) delivered neonates. The bias in this study is that they should compare the two-step with one-step in vaginal delivery, not with CS. And further, the PH values in 'two-step' in this study was within normal range, and the author did not report the rate of asphyxia, that may be those value was the physiological changing in vaginal birth if all the babies in that study were survived without complications. In this study, we have found no baby depression in all cases, thought 5.4 % (5/92) interval was over 190 sec. We did not measure the value of PH of fetus, but by observing the activities of fetus, normal heartbeat, color, and face movement, and even cry, those signs served a good indicators of the babies.

Conclusion

(1) Interval of head to shoulder in natural birth by waiting for a contraction (two step) method is longer than 60 sec. the average interval of head to shoulder delivery in this study is 71.043 sec \pm 61.015 sec, Mean $+2^{\circ}$ std is 193.073 sec. 95% CI (15.650-229.150) sec. 55.43% (51/92) percent interval of head to shoulder were less than 60 sec, 39.1% (36/92) were over 60sec and less than 190 sec. 5.4% (5/92) over 190 sec.

(2) The majority (96.73% (89/92)) shoulders were delivered by one contraction, few caces by twice contraction, in those cases" shoulder visible on vulvar gapping and return to vaginal" could be observed. That indicated if the shoulder did not delivered at first contraction, attention should be paid to assess the possibility of shoulder dystocia.

(3) If allow shoulder delivered by uterus forces, mostly shoulders were emerged from perineum not from under pubic that should be considered as natural process of shoulder delivery style.

(4) Baby live signs observation including face movement, sucking, burble from nose and mouth, good color of skin are good indicators of baby condition assessment. Baby may cry before the shoulder delivered without any harmful effect be observed, but some may be not cry even after birth. That may be a good sign to release the tension of both health caregiver and mothers.

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