Training effect on performance of mediolateral episiotomies for obstetricians and midwives

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Abstract

Background: Simulation as an extensive used method for obstetric education is usually practiced for beginners, here we offered a course with simulated practice of performing a mediolateral episiotomy (MLE) for obstetricians and midwives in different seniority, and to evaluate the training effect on their knowledge and accuracy of cutting a MLE before and after the course.

Methods: 82 participants were recruited at three different obstetric centers, included 35 obstetricians and 47 midwives. More than 5 years obstetric work in their careers were deemed to senior ones, and there were 29 junior and 53 senior ones. A 30 minutes training course were given to all participants by one senior obstetrician. Special paper pads simulating perineum at crowning were used to cut MLE before and after the course, and a questionnaire about their occupation characteristics was given before the course. Three parameters of the MLE were analyzed and compared.

Results: On performing MLE, midwives had more training history and conducted cases than obstetricians ($p < 0.01$). After the course, the mean values of three parameters were significantly increased from 31.46 mm in length, 48 degrees in angle and 9.09 mm in distance to 34.29 mm, 50.622 degrees and 10.82 mm respectively. In subgroups, obstetricians had angle degrees increased significantly ($p = 0.022$), while midwives had the length and distance increased significantly ($p = 0.001$, $p = 0.004$). Senior participants had the length and distance of incisions increased significantly ($P = 0.008$, $P = 0.020$), the accuracy of these two parameters also improved significantly ($P = 0.002$, $P = 0.034$). In subgroups of midwives and seniors, the accuracy of the length and distance also improved significantly after the course.

Conclusions: Obstetricians need more professional training about midwifery including episiotomy. Simulated training of this mode is suitable for obstetric education like performing MLE. The absence of senior obstetricians and midwives should be avoided in such medical education.

Background

Obstetric anal sphincter injuries (OASIS) are associated with numerous consequences as anal fecal incontinence, fecal urgency, dyspareunia and psychological effects for women. A meta-analysis found that 30% - 50% of women were symptomatic one year after OASIS, even with repaired[1, 2]. And it could result in as high as 53% - 80% of longer-term anal incontinence and urgency[3, 4], affecting women's quality of life. The purpose of episiotomy is to expedite delivery for fetal distress, increase the vaginal outlet of instrumental deliveries or shoulder dystocia, or to reduce the risk of OASIS[5]. Episiotomy as the most important preventative measure to reduce third-and fourth-degree or OASIS is used worldwide, despite the confliction of the protective effect[6, 7]. Episiotomy technique usually contains three main parameters: the length of the incision, the incision angle, and the distance between the start point and the posterior fourchette. Several episiotomies were described, the midline episiotomy is associated with high rates of OASIS[8-10], compared with mediolateral episiotomy (MLE), there was no significant difference in pain, dyspareunia and infection rates[11].

The WHO recommends restrictive use of episiotomy, and states that episiotomy should be considered as following: complicated vaginal delivery (breech, shoulder dystocia, forceps or vacuum extraction), scarring from female genital mutilation or poor healed third-or fourth-tears, fetal distress. Restrictive episiotomy resulted in less OASIS and fewer healing complications compared to routine episiotomy[12]. In China, the use of episiotomy is restrictive and left MLE is considered standard practice.

The internationally accepted standardized definition or categorization of episiotomy is still on the way, the National institute of Health and Care Excellence (NICE 2007) guideline for intrapartum care recommended that a MLE should perform originating at the vaginal fourchette and the angle to the vertical axis should be between 45 and 60 degrees. Dharmesh et al. found that perineal distension of 170% in the transverse direction and 40% in the vertical direction at crowning, there were 15-30 degree between episiotomy incision angles and suture angles, the suture angles of 40-60 degrees were in the safe zone[9]. Performing a MLE at least 60 degree from midline could in fact protect against OASIS[13], and there was a U-shaped association between suture angles and risk of OASIS, Stedenfeldt et al. regarded suture angle of 30-60 degrees as the safe zone[14]. When suture angle was 25 degrees, there was a 10% incidence of OASIS and each additional 6 degrees away from midline could reduce half of this risk, the incidence was only 0.5% at the suture angle of 45 degrees[15-17]. The revised Royal College of Obstetricians and Gynecologists (RCOG) (Green-top guideline 2015 NO.29) recommends three preventative measures to reduce the risk of OASIS as flowing: episiotomies at 60 degrees to the midline at crowning, manual perineal protection and warm perineal compresses in second stage of labor. MLE must be performed correctly for better preventing anal sphincter injury. Trainings became the main method of improving skills for junior obstetricians and midwives. The knowledge of performing a proper MLE and repair had universally introduced and trained. Obstetricians tended to cutting longer episiotomy and more obtuse angle compared with midwives[18, 19]. Personal career may affect the effect of such training. Simulated training as an extensive used method for obstetric education is usually practiced for beginners. The different impact of training on senior and junior practitioners is rare seen in previous researches. Herein, we offered a course with simulated practice of performing a mediolateral episiotomy (MLE) for obstetrician and midwives in different seniority, and to evaluate the training effect. **Methods:**

Eighty-two participants were recruited at three different obstetric centers, included 35 obstetricians and 47 midwives. More than 5 years obstetric work in their careers were deemed to senior ones, and there were 29 junior and 53 senior ones. We used a mode of “operate-train-operate” to immediately evaluate the effect of training course. A 30 minutes training course were given to all participants by one senior obstetrician. This course mainly described in three scenarios about episiotomy: (i) detail of perineal anatomy and the transformation at crowning, (ii) how to perform a MLE incision properly, (iii) techniques for repairing an episiotomy and perineal tears.

Before the training course, participants were asked to complete a cross-sectional questionnaire, which contained occupations of obstetrician or midwife, obstetric work years, 3 single choice questions (knowledge about perineum anatomy, cases of delivery and episiotomy) and 4 multiple choices questions (history of training about episiotomy, causes for mediolateral episiotomy, worry about most when cutting

a mediolateral episiotomy and main concerned about when severe tear happened) (figure1). A commonly used episiotomy incision pad with anus denoted by a cross and posterior vagina by a semi-circle (figure 2) was used for everyone to cut MLE as their usual practice. After taking back the pad and questionnaire, the training course were given. A MLE as a surgical incision is recommend given between 45-60 degrees from the midline[20]. Recommended values about the incision length and distance had not been reported in literatures yet, we usually cut MLE length in 3-4 cm and distance around 1cm, the length approximately met the scared length 17 mm according to the perineal distension at crowning[5, 14]. The French College of Gynecologists and Obstetricians (2005) recommends a mediolateral incision over an average length of 6 cm. In this course, we had taught the participants that the following parameters may be the most suitable ones: length of 3-4 cm or more, angle of 45-60 degrees and distance of 0.9 cm or more. We considered those incisions to be correct according to these criteria. Then the participants were invited to cut the pad according to those they had learned from the course. They were prompted to make MLE at 60 degrees, more than 3 cm in length and proper distances from fourchette. A unique number was created by each participant and marked in their own pads and questionnaire. Three parameters were considered for every episiotomy incision: (i) the distance of starting point of the incision from fourchette in millimeters (D), (ii) the angle of incision to the perpendicular in degrees (A), (iii) the length of the incision in millimeters (L). (figure 2)

Angles and distances were measured using common protractors and rulers. Continuous variables are presented as mean $\pm$ sd or median and range, as appropriate. Categorical variables are presented as rate. The *t* test was used to compare continuous variables and the chi-squared test was used to analyze categorical variables. All tests applied were two-tailed, statistical significance was considered at $p < 0.05$. Data were analyzed by SPSS statistical software (SPSS 19, Inc., Chicago, IL). This study was approved by the Ethics Committees of Women' hospital, School of Medicine Zhejiang University and Approval number 20190057, and all the participates were verbally informed the project and consented to participate.

Results

The characteristics of 82 participants (35 obstetricians and 47 midwives) were detailed in table1. There were 18(51.4%) junior obstetricians and 11(23.4%) junior midwives. They knew well about the perineal anatomy, only 4(4.9%) participants were unfamiliar with the anatomy of perineum. There were 74 (90.2%) participants received MLE training before, including theoretical (24 [29.3%]), practical (21 [25.6%]) and both (29 [35.3%]). More than half of obstetricians had conducted MLEs or delivers less than 10 cases, while the majority of midwives had conducted more MLEs and delivers than 50 cases.

Preventing OASIS was the major (74/82) cause for performing MLE, according to this survey, fetal distress and macrosomia were the second and third cause respectively. For the obstetricians only, instrument deliver become the leading cause of performing MLE (30/35). When performing MLE, most of them (53/82) concerned about if they had made a proper incision. OASIS may be the nightmare for them,

the difficulty of suturing confused 84.1% (69/82) of participants. Furthermore, the consequence of repeated suturing and pelvic floor disorders should be considered.

The details about incisions performed before and after course were shown in table 2. Before training, the mean values of three parameters were 31.46 mm in length, 48 degrees in angle and 9.09 mm in distance. They increased to 34.29 mm, 50.622 degrees and 10.82 mm respectively, and had significant differences after the course. And obstetricians had angle degrees increased significantly ($P = 0.022$), while midwives had the length and distance increased significantly ($p = 0.001$, $p = 0.004$). Senior participants had the length and distance of incisions increased significantly ($P = 0.008$, $P = 0.020$), the accuracy of these two parameters also improved significantly ($P = 0.002$, $P = 0.034$). Although the degrees and accuracies of the angle increased in junior and senior groups, no improvements had been seen with statistical significance. After the course, the accuracy of the length and distance showed significantly increased in all participants, while the accuracy of the angle showed no significant difference. In subgroups of midwives and senior participants, the accuracy of the length and distance also improved significantly after the course. (table 3) Although, the junior ones cut the MLE in more length and distance compared to senior ones, but these were no statistical significance, only obstetricians significantly improved in length compared with midwives. (Table 4)

Discussion

MLE is regarded as the most important surgery to reduce OASSIS for normal or instrument vaginal delivery, although there are conflicting conclusions about the role of MLE in preventing OASIS[21], which may be due to the absence of consensus on optimal MLE for preventing OASIS. Traditional perineal laceration management training programs focused on repairing techniques. We should lay more emphasis on training as 'how to perform an episiotomy'. Our study focused on this point and we found that proper training course could improve the practical knowledge of performing MLE, and they could cut MLE more optimally.

We found that more than half of obstetricians and midwives cut MLE correctly as measured by angles, the validity of angle raised to 72.3% in midwives and 65.7% in obstetricians after our training. The total cutting accuracies of length and distance were significantly improved after the course. Junior participants and midwives were more likely to cut the angle within the range (72.4% and 72.3%), and 69.5% of all participants had cut the angle correctly. While Vasanth et al. revealed that only 22% obstetricians and no midwife cut the incision of MLE correctly[18], Fanny et al. found only 43% accoucheurs had cut the correct range[22]. The variability of MLE incision between simulated setting and actual patients were highlighted, the high accuracy of our study might be attributed to the cutting in a paper for practice, while they had measured the actual MLE cut in delivery. Training with simulated settings can improve practical skills and cognitions, multitudinous training models were used for medical teaching.

A suitable training model enabled accurate measurement of MLE parameters and improved knowledge of episiotomy. Silf et al. used a bespoke training model to perform MLE. They found that only 31.9% of midwives and 41.5% of obstetricians cut the incision with angle ranging from 40 to 60 degrees, history of previously perineal repair training made no difference for correctness of episiotomy[23]. Wong et al. found midwives made MLE closer to the midline by 7.6 degrees compared with doctors and the main indications for performing episiotomies were to expedite delivery, prevent OASIS and fetal distress[24]. Our study also showed that midwives trended to cut a smaller angle, and preventing OASIS, fetal distress, macrosomia were the main indications for performing a MLE. We used a paper model to evaluate the training impacts on participants, and found the accuracy of incisions increased after training. Achieved 72.3% of midwives and 65.7% obstetricians had cut the incision with angle ranging from 45 to 60 degrees. Obstetricians cut more obtuse angle after the course, while midwives had increased length and distance significantly. The participants of SUPPORT (Strategy for Using Practical aids for Prevention of OASIS, Recording episiotomies and clinician Training) also reported that they had improved knowledge of performing an episiotomy during the training[25].

Simulated practices are commonly used in obstetrical education. Our study was the rare one that evaluated how the participants performing a simulated MLE before and after the training course, training protocol had positive role as significant improvements were observed. The main limitation of our study was that MLEs were simulated cut at paper pad, and it might be some difference to real cut.

Many researches had studied the relationship between the scar or suture parameters of episiotomies and OASIS[14-16, 26-28]. For the varying degrees of extensions at crowning, accoucheurs can't foreknow the suture angle, length and distance from midline when cut a MLE[13, 29-31]. Further studies should focus on the relationship between OASIS and the cutting angle, length and distance. As the cutting parameters of MLE are instantaneous, scissors with scale plate and fixed angle may be the ideal candidate. Studies used a special device as Episcissors-60 cutting at crowning showed an encouraging result for performing a MLE[25, 29]. Now no consensus is reached on optimal MLE for preventing OASIS, randomized controlled trials using special device should design to carry out.

Conclusion

Obstetricians need more professional training about midwifery including episiotomy. Simulated training of this mode is suitable for obstetrics education like performing MLE. A majority of participants knew well about the perineal anatomy and performing a MLE properly. The most causes of cutting a MLE were preventing OASIS, fetal distress and macrosomia. When performing MLE, major participants would think about the property of the incision and worry about the healing of wound. The absence of senior obstetricians and midwives should avoid in such medical education.

Declarations

Ethics approval and consent to participate

This study was approved by the Ethics Committees of Women' hospital, School of Medicine Zhejiang University and Approval number 20190057, and all the participates were verbally informed the project and consented to participate.

Consent for publication

Not applicable.

Availability of data and materials

The datasets used in the current study are available from the corresponding author on reasonable request.

Competing Interest

The authors declare that they have no conflict of interest.

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Authors contributions

BZ had developed the conception and drafted the work, YC and QL designed the study and revised, FX and TD conducted data analysis and interpretation, YP and YW assisted for project implement, QL acted as a consultant. The authors read and approved the final manuscript.

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Abbreviations

MLE: mediolateral episiotomy; OASIS: obstetric anal sphincter injuries; WHO, World Health Organization

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Tables

Table 1 characteristics of participants and their occupation history

	Obstetrician N=35 (%)	Midwife N=47 (%)	p-value
Obstetric work year			0.011
<5years	18 (51.4)	11 (23.4)	
≥5years	17 (48.6)	36 (76.6)	
Knowledge of anatomy			0.023
master	16 (45.7)	33 (70.2)	
acquaintance	18 (51.43)	11 (23.4)	
unfamiliar	1 (2.9)	3 (6.4)	
Training history			0.001
theoretical+ practical	5 (14.3)	24 (51.1)	
theoretical	15 (42.9)	9 (19.1)	
practical	9 (25.7)	12 (25.5)	
none	6 (17.1)	2 (4.3)	
Conduct delivers			<0.001
<10	18 (51.4)	5 (10.6)	
≥10-50	8 (22.9)	2 (4.3)	
≥50-100	4 (11.4)	3 (6.4)	
≥100	5 (14.3)	37 (78.7)	
Conduct MLEs			<0.001
<10	20 (57.1)	7 (14.9)	
≥10-50	11 (31.4)	9 (19.1)	
≥50-100	1 (2.9)	7 (14.9)	
≥100	3 (8.6)	24 (51.1)	

Table2 MLE parameters performed by participants before and after the training course

	Length (mm)			Angles (degrees)			Distance (mm)		
	before	after	p-value	before	after	p-value	before	after	p-value
Obstetricians (n=35)	33.97	34.66	0.558	48.657	53.057	0.022	9.17	10.43	0.111
Midwives (n=47)	29.60	34.02	0.001	47.511	48.809	0.393	9.02	11.11	0.004
Junior (n=29)	33.07	35.07	0.099	46.448	49.586	0.140	9.31	11.10	0.013
Senior (n=53)	30.58	33.87	0.008	48.85	51.191	0.107	8.96	10.66	0.020
Total (N=82)	31.46	34.29	0.002	48.000	50.622	0.028	9.09	10.82	0.001

More than 5 years obstetric work in their careers were deemed to senior ones, others as junior ones.

Table3 Accuracy of MLE performed by participants before and after the training course

	Validity of length n (%)			Validity of angle n (%)			Validity of distance n (%)		
	before	after	p-value	before	after	p-value	before	after	p-value
Obstetrician (n=35)	25(71.4)	28(80.0)	0.371	23(65.7)	23(65.7)	1.000	19(54.3)	25(71.4)	0.146
Midwife (n=47)	22(46.8)	34(72.3)	0.003	24(51.1)	34(72.3)	0.055	21(44.7)	30(63.8)	0.022
Junior (n=29)	22(75.9)	23(79.3)	1.000	15(51.7)	21(72.4)	0.181	16(55.2)	21(72.4)	0.131
Senior (n=53)	25(47.2)	39(73.6)	0.002	32(60.4)	36(67.9)	0.540	24(45.3)	34(64.2)	0.034
Total (N=82)	47(57.3)	62(75.6)	0.001	47(57.3)	57(69.5)	0.144	40(48.8)	55(67.1)	0.005

More than 5 years obstetric work in their careers were deemed to senior ones, others as junior ones.

Table 4 MLE parameters changes before and after the training course

		Δ Length (mm)	<i>p</i> - value	Δ Angle (degrees)	<i>p</i> - value	Δ Distance (mm)	<i>p</i> -value
Total		2.83 ± 7.86		2.62 ± 10.58		1.73 ± 4.66	
Occupation			0.028		0.194		0.427
Obstetrician		0.69 ± 6.86		4.40 ± 10.81		1.26 ± 4.54	
Midwife		4.43 ± 8.25		1.30 ± 10.32		2.09 ± 4.77	
Obstetric	work		0.444		0.752		0.923
year							
<5years		2.00 ± 6.31		3.14 ± 11.12		1.79 ± 3.66	
≥5years		3.28 ± 8.62		2.34 ± 10.38		1.70 ± 5.16	

Δ Difference before and after the training course, *T* test for *p*-value

Figures

Questionnaire

Occupation: ☐ Doctor ☐ Midwife

Obstetric work years: Year

1. Knowledge about perineum anatomy:

☐ Acquaintance ☐ Some ☐ None

2. History of training about episiotomy (multiple):

☐ Theoretical ☐ Practical ☐ None

3. Cases of delivery: ☐ <10 ☐ <=10—50 ☐ <=50-100 ☐ >=100

4. Cases of episiotomy: ☐ <10 ☐ <=10—50 ☐ <=50-100 ☐ >=100

5. Causes for mediolateral episiotomy (multiple):

☐ Preventing OASIS ☐ Preterm delivery ☐ Macrosomia ☐ Expedite delivery

☐ Instrumental delivery ☐ Breech delivery ☐ Twin delivery ☐ Fetal distress

6. Worry about when cut a mediolateral episiotomy (multiple):

☐ Bleeding ☐ Trauma ☐ If the incision properly (length, distance, angle)

☐ Repair difficultly ☐ None

7. Main concerned about when severe tear happened (multiple):

☐ Repair difficultly ☐ Massive bleeding ☐ Infection of incision

☐ Repeated repair ☐ Pelvic floor dysfunction (fecal incontinence, dyspareunia)

☐ None

Figure 1

The participants were asked to complete this cross-sectional questionnaire which contained occupations of obstetrician or midwife, obstetric work years, training history and some questions about cutting MLE.

Figure 2

Paper used for training to cut MLE and Measurements undertaken after each performed MLE by participants. D = the distance of starting point of the incision from fourchette in millimeters, A = the angle of incision to the perpendicular in degrees, L = the length of the incision in millimeters

Supplementary Files

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- [episiotomydata.xls](#)