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Original Article

Effect of Uterine Fundal Pressure Applied in the Second Stage of Labor on Birth Outcomes

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Abstract

Background: One of the most applied methods to intervene in labor is fundal pressure with intention to promote or accelerate the time to a spontaneous vaginal birth with a prolonged second stage of labor. **Objectives:** to assess the effect of uterine fundal pressure applied in the second stage of labor on birth outcomes. **Patients and methods:** This observational study was conducted on 136 pregnant women at term admitted for labor at the department of Obstetrics & Gynecology, Menoufia University Hospital from May 2022 to May 2023. The participants divided into two equal groups each one included 68 participants. Group 1 Pregnant women who received fundal pressure in the second stage of labor, Group 2 Pregnant women who did not receive fundal pressure in the second stage of labor. Data were collected and tabulated. **Results:** There were no statistically significant differences between both group with regard to O2 saturation, Apgar score, and Shoulder dystocia. But there was highly significant difference between two group as regard maternal outcomes with P-value<0.001. **Conclusion:** Fundal pressure had shortened the second stage of labor but had increased the rate of trauma, perineal laceration, and cervical laceration with insignificant effect on fetal outcomes

Keywords: Apgar score. Episiotomy, Fundal pressure, Uterine rupture, Vaginal delivery,

Introduction

One of the most applied methods to intervene in labor is fundal pressure. Uterine fundal pressure is pressure applied to a woman's uterine fundus in the direction of the vagina during the second stage of labor with intention to promote or accelerate the time to a spontaneous vaginal birth. [1] With a prolonged second stage of labor, maternal exhaustion may reduce a woman's ability to generate sufficient abdominal pressure to facilitate her baby's birth. Application of external force through fundal pressure has previously been thought to assist vaginal birth, reducing the need for alternative and more invasive interventions to manage prolonged second stage such as vacuum extraction, forceps delivery or cesarean section. [2] Although there are strong opinions in favor of and against fundal pressure, there is not enough evidence about its benefits and harms for maternal and infant health. [3] Fundal pressure may lead to fetal bradycardia and fetal hypoxia, asphyxia, low Apgar scores, low arterial fetal cord pH, brachial plexus injury, humerus, and clavicular fractures Furrer concluded that fundal pressure associated fetal acidosis, shoulder dystocia and 1st–5th minute low Apgar score. In different studies, the partial carbon dioxide pressure (pCO_2) value was higher, and the partial oxygen pressure (pO_2) value was lower in the fundal pressure group. [4] Also Fundal pressure may cause severe complications in the mother, such as abdominal bruising and pain, maternal burnout, need for analgesics, dyspareunia, urinary stress incontinence, perineal pain, uterine rupture, severe perineal lacerations, increased episiotomy rate, deepening in the episiotomy incision, and increased cervical injury. [5]. The decrease in the pO_2 value resulting from hypoxia also decreases the peripheric oxygen saturation (SpO_2), which indicates oxygenation in the blood. In the literature, it is observed that no sufficient data are available regarding the investigation of

the effects of fundal pressure on fetal SpO_2 saturation [6]

The aim of the study was to assess the effect of uterine fundal pressure applied in the second stage of labor on fetal and maternal outcomes.

Patients and Methods

An observational and comparative study carried out at department of Obstetrics & Gynecology, Menoufia University Hospital from May 2022 to May 2023.

All procedures were carried out in accordance with the ethical standards of the institutional committee. The study was received the approval from Ethical Committee of faculty of medicine – Menoufia University under code number 4/2022 OBSG 28. The aim and steps of the study was explained to the participants and written informed consent was obtained from all the participants after explanation the nature and scope of the study.

This study included cases according to the flow chart following in figure (1), 136 pregnant women at term admitted to the hospital for labour. The participants divided into two equal groups each one included 68 participants

Inclusion criteria: were pregnant women who were pregnant at a single term fetus with vertex presentation in labor without epidural or spinal anesthesia.

Exclusion Criteria: were pregnant women who were pregnant at multiple gestations or had a high-risk pregnancy such as preeclampsia, diabetes mellitus and eclampsia. Also, pregnant women delivered a preterm fetus were excluded. Pregnant women who were at labor with any presentation except vertex presentation were excluded. Pregnant women who received epidural anesthesia were excluded too.

All patients included in this study were informed about the benefit and possible risk, explanation of the procedure and a written consent was obtained from every patient and were divided in two groups

according to the use of fundal pressure during the second stage of labor or not.

Group I (Fundal pressure group), 68 patients. Pregnant women who received fundal pressure in the second stage of labor were included in this group.

Group II (Non fundal pressure group), 68 patients. Pregnant women who did not receive fundal pressure in the second stage of labor were included in this group.

In delivery room, the researcher only observer recorded only if the procedure was done or not and the results, pregnant women who received fundal pressure during the routine labor practices of the hospital were included in Group I. The status of applying fundal pressure was observed by the researcher. Uterine fundal pressure applied manually by obstetrician with one of the following modes (forearm and elbow, fist of one hand, palm of one hand or combined). The obstetrician press on the upper most of the uterus at 30 to 45 angle to the maternal spine in the direction of the pelvis concomitant with each uterine contraction. The maneuver performed with careful maternal and fetal observation with fetal heart rate monitoring. The reason for fundal pressure as failure in pushing fetus, fetal distress and prolonged labor. Also, the mode of application was noted. Pregnant women who did not receive fundal pressure were included in group II.

The duration of the second stage of labor was calculated. The infant was placed under a radiant heater, and the 1st- and 5th-min Apgar scores were evaluated. With a pulse oximeter, the neonatal oxygen saturation was measured. It was checked whether the neonate developed any complications and was taken into intensive care. The APGAR score is generally done at one and five minutes after birth and may be repeated later if the score is and remains low. Scores of seven and above are generally normal; four to six, fairly low; and three and below are generally regarded as critically low and cause for immediate resuscitative efforts. The degree of perineal laceration

episiotomy extension, cervical laceration, postpartum hemorrhage, rupture uterus and shoulder dystocia were evaluated. Extension, cervical laceration, postpartum hemorrhage, rupture uterus and shoulder dystocia were evaluated.

Ethical consent

Reviewing the proposal was carried out before starting and approved by the ethical committee of the Menoufia Faculty of Medicine in accordance with the Declaration of Helsinki. Written and informed consent was obtained from the patient's caregivers to participate in the study after an explanation of its purpose and being advised of their right to withdraw from the study at any time. Patients were coded for data entry so their names could not be identified.

Statistical Analysis:

Data were collected, tabulated and statistically analyzed using an IBM compatible personal computer with Statistical Package for the Social Sciences (SPSS) version 26 (SPSS Inc. Released 2018. IBM SPSS statistics for windows, version 26.0, Armnok, NY: IBM Corp.). Descriptive statistics e.g. qualitative data were expressed as Number (No), percentage (%), while quantitative data were expressed as mean, standard deviation (SD) and range (minimum-maximum)

Analytic statistics e.g. Student's t-test was used for comparison of quantitative variables between two groups of normally distributed data, while Mann-Whitney's test was used for comparison of quantitative variables between two groups of not normally distributed data. Chi-square test (χ^2) was used to study association between qualitative variables. Whenever any of the expected cells were less than five, Fischer's Exact test was used. Significant test results were quoted as two-tailed probabilities. Significance of the obtained results was judged at the 5% level ($P < 0.05$).

Results

Regarding to the demographic data of cases there were no statistically significant differences as regarding the

mean age of the study population in both groups, the mean gestational age, BMI and the mean parity and RH of study participants. (Table 1).

There were statistically significant differences between both groups with regard to perineal laceration P= 0.032 and need for episiotomy P= 0.001 and postpartum hemorrhage P = 0.030. (Table 2)

The mean duration of the second stage of labor is shorter in the nonfundal pressure group (18.3±11.2) minute than in the fundal pressure group (24.3±12.2) minute (P< 0.05). There were no statistically significant differences between both groups` with regard to O_2 saturation, Apgar score at one minute, Apgar after 5 min, Shoulder dystocia and NICU admission. (Table 3).

Table (1): Comparison between the studied groups regarding clinical and obstetric history

Item	Fundal pressure group (n= 68)		Non-fundal pressure group (n= 68)		Student t test	P-value
Age (in years):						
Mean ± SD	24.7 ± 4.4		24.9 ± 5.0		0.26	0.799
Range	18-37		16-42			
Gestational age (in weeks):						
Mean ± SD	39.0±1.3		39.1±1.4		0.33	0.744
Range	37-42		37-42			
BMI:						
Mean ± SD	24.7±3.3		25.2±3.5		0.89	0.373
Range	17-31		19-31			
	No	**%**	**No**	**%**	**Chi square test**	**P-value**
Parity:						
Primiparous	25	36.8	23	33.8	0.13	0.720
Multiparous	43	63.2	45	66.2		
RH:						
Positive	49	72.1	54	79.4	1.00	0.317
Negative	19	27.9	14	20.6		

BMI: Body Math Index, RH: Rhesus factor

Table (2): Comparison between the studied groups regarding maternal outcome

Variables	Fundal pressure group (n= 68)		Non-fundal pressure group (n= 68)		Chi square test	P-value
	No	%	No	%		
Perineal lacerations:						
No lacerations	40	58.8	54	79.4	8.84	**0.032***
1st	14	20.6	9	13.2		
2nd	10	14.7	5	7.4		
3rd	4	5.9	-	-		
4th	-	-	-	-		
Episiotomy:						
Yes	40	58.8	20	29.4	11.93	**0.001***
No	28	41.2	48	70.6		
Rupture uterus:						
Yes	2	2.9	-	-	5.19	**0.0496**
No	66	97.1	68	100.0		
PPH:						
No	49	72.1	61	89.7	7.00	**0.030***
Traumatic	10	14.7	3	4.4		
Atony	9	13.2	4	5.9		

**Significant (P <0.05), PPH: Post-Partum Hemorrhage*

Table (3): Comparison between the studied groups regarding fetal outcome (secondary outcome)

Variables	Fundal pressure group (n= 68)		Non-fundal pressure group (n= 68)		Student t test	P-value
O_2 saturation:						
Mean ± SD	93.4±3.2		93.7±2.8		0.62	0.535
Range	82-98		87-98			
Apgar score at first Min:						
Mean ± SD	6.9±1.6		6.8±1.4		0.28	0.780
Range	4-9		4-9			
Apgar after 5 min.:						
Mean ± SD	8.9±0.4		8.9±0.2		0.74	0.459
Range	6-9		8-9			
	No	**%**	**No**	**%**	**Fischer's Exact test**	**P-value**
Shoulder dystocia:						
Yes	2	2.9	-	-	2.03	0.496
No	66	97.1	68	100.0		
NICU:						
Yes	5	7.4	1	1.5	2.79	0.208
No	63	92.6	67	98.5		
Neonatal weight (kg):			**Student t**			
Mean ± SD	3.51±0.4	3.49±0.31	**test**	0.782		
Range	2.7-4.5	3.0-4.40	0.28			

SD: standard deviation, Range: minimum- maximum

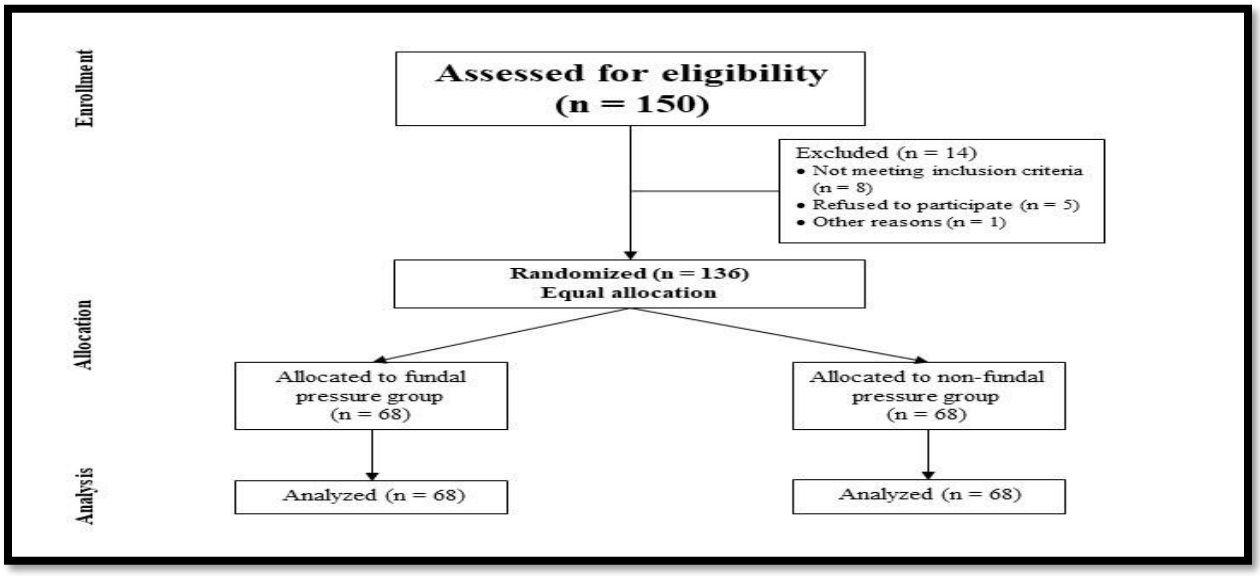

Figure 1: Flow chart for the study

Discussion

As a result of the controversial nature of fundal pressure and fear of litigation, obstetricians often do not document their performance of this procedure because even if fundal pressure does not increase the biologic risks, its use in cases of adverse outcomes would be perceived as causative, not coincidental. [7]

Our study had showed that there were no statistically significant differences as regarding the mean age of the study population in both groups, the mean gestational age, BMI, the mean parity and RH of study participants. with P-value =0.799, 0.373 ,0. 0.317 and 0.720 Respectively.

Our study found that there was highly significant difference between both groups regarding the duration of second stage of labor as the mean duration of the second stage of labor is shorter in the nonfundal pressure group (with (P< 0.05), Although fundal pressure usually seems like a practice performed to shorten the second stage of labor. Our result match with Gamze and Ayla [8] who found the duration of the second stage of labor in the fundal pressure group was (29.73-32.33)

min, while it is (8.46 _ 10.49) min in the non-fundal pressure group with p = 0.001. Cosner reported a longer duration of the second stage of labor among women who had fundal pressure applied compared with those who delivered spontaneously. [9] But our result did not agree with Sartore [10], Moiety and Azzam [11] who found that fundal pressure shortened the duration of the second stage of labor .We referred our result to the reasons for applying fundal pressure which were a failure in pushing the fetus and prolonged labor. These factors were also the factors likely to cause the prolongation of the second stage of labor.

According to our study results, fundal pressure increases the rate of trauma, perineal laceration, and cervical laceration which showed highly significant difference between two groups as regard elongation of episitomy (25.0%) in group I to (2.9%) in group II with P-value <0.001 and cervical laceration (86.8 %) in group I to (45.6%) in group II with P-value<0.001. Acmaz [12] and Pınar [13] agreed with our results as episiotomy and spontaneous laceration were observed more in women who received fundal pressure.

There were no statistically significant differences between both groups with regard to O2 saturation, APGAR score at one minute, APGAR score after 5 min. This coped with Acmaz [12] and Matsuo [11].

Strength of the study. We used a mixed-methods approach employing both qualitative and quantitative research methods. Mixed-methods approaches are likely to yield the most comprehensive picture, as their integration facilitates a deeper and broader understanding of the phenomenon. Another benefit is that each method can help to validate the other (triangulation).

Limitations in this Study was mentioned that fundal pressure was applied when they deem necessary (failure in pushing the fetus, fetal distress, prolonged labor). Therefore, study outcomes might had

been affected by this situation. Another limitation of the study was that fundal pressure was not applied to every pregnant woman in the same pressure, form, number, and duration Therefore, study outcomes might had been affected.

Conclusions

Fundal pressure increased the need for episiotomy, elongation of the episiotomy incision, the rate of perineal laceration and the rate of cervical laceration, but it did not affect the neonatal outcome. The use of evidence-based practices in labor is important in terms of minimizing birth and postpartum complications and maintaining mother-infant health. Therefore, the application of fundal pressure, which is not evidence-based, should not be preferred during labor. Fundal pressure was not applied to every pregnant woman in the same force, form, number, and duration Therefore, study outcomes might have been affected.

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Competing interests

The authors declare that they have no competing interests.

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Authors' contributions

MA was responsible for conception of the idea. HE and EH helped in the study design, acquisition of data, and drafting the manuscript. HA, HE and AW were responsible for conception of the idea, study design, analysis of the data, and drafting of the first manuscript. Mi was responsible for analysis and interpretation of the data, writing the manuscript, and responding to the reviewer comments. HE, EH, HA and AW helped in the acquisition of data, management of the patients, and revising the manuscript. RA is the senior author who was responsible for supervision of the whole research and revising the final manuscript. All authors approved the manuscript and agreed to be accountable for all aspects of the work.

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