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Fundal pressure (Kristeller maneuver) during labor in current obstetric practice: assessment of prevalence and feto-maternal effects

TO THE EDITOR: Uterine fundal pressure (FP) to shorten the second stage of labor (Kristeller maneuver) is a controversial procedure widely regarded as obsolete in modern obstetrics.

The manual force applied in an uncontrolled fashion over the uterine fundus has been associated with feto-maternal complications including uterine rupture, fractured ribs, anal sphincter damage, fetal hypoxemia and intracranial hemorrhage.[1]

Since data on beneficial and harmful effects are still inconclusive, we have conducted a study to assess prevalence of FP in vaginal deliveries and the associated materno-neonatal outcome.

We have included all women delivering from October 1st, 2009 to September 30th, 2011 at the Obstetrical Department of the University Hospital of Verona.

A FP procedure was recorded any time a force was applied on the fundus of the uterus and down toward the birth canal during the second stage of labor.

Information about its use was obtained from the obstetric team assisting the woman; partographs were reviewed and patients interviewed in the ward.

Delivery room procedures, including FP, followed written protocols and regularly revised guidelines; the study was approved by the Ethic Obstetric Committee within the Obstetrical Department of the University Hospital of Verona.

Umbilical blood gas analysis was performed in all deliveries by the midwife, immediately after birth. Cut-off values for fetal metabolic acidemia were pH<7.05 and a base deficit (BD) ≥12 mmol/L in the cord artery.[2]

Perineal condition after delivery was assessed according to the RCOG classification.[3]

Statistical analysis of the data was performed to calculate Odds ratios, using a logistic regression; statistical significance was set at P<0.05.

During the two-year study period the total parturient population included 3585 women whose reproductive characteristics and mode of delivery are presented in Table I. A total of 2380 women were delivered vaginally (66.4%), prevalence of vacuum-assisted deliveries was 2.6%. FP was recorded in 236 deliveries giving an incidence of 6.6% of the total parturients; however, in some instances the maneuver was applied in association with VE while in 162 cases was the only operative procedure, giving an incidence of 4.5%. In this latter group, manual pressure was recorded once in 64 cases (39.5%), twice in 69 (42.6%), ≥3 times in 29 (17.9%).

In order to evaluate the effects of FP upon neonatal metabolic outcome and maternal perineum, 2366 singleton vaginal deliveries were studied and divided into 3 groups: 2088 spontaneous deliveries (SVD), 89 operative deliveries with vacuum (VE) and 162 deliveries assisted with FP; information was missing in 27 cases. Table II presents maternal and neonatal factors which were controlled in the logistic regression analysis. Feto-maternal outcome is presented in Table III.

Rates of fetal metabolic acidosis were significantly higher in the VE (11.2%) and FP (4.9%) groups compared to the SVD (1.3%) group (OR 8.42, 95% CI 3.3-21.1 and OR 2.84, 95% CI 1.1-7.1, respectively). Apgar score <7 at 1st minute was also significantly associated with vacuum operative delivery (OR 13.19, 95% CI 5.9-29.4) and use of FP (OR 2.59, 95% CI 1.1-5.9).

The spontaneous delivery group suffered the lowest incidence (42.5%) of severe perineal dam-

TABLE I.—*Reproductive characteristics and mode of delivery of the total parturient population.*

Parameter	Patients N.=3585 N. (%)
Age (years) (mean±SD)	31.7±5.5
Range	15-49
Age >35 years	950 (26.5)
Immigrant status	1278 (35.6)
Nulliparity	1761 (49.1)
Multiple gestations	131 (3.7)
Previous C-section	512 (14.3)
Cesarean section	1205 (33.6)
Vaginal delivery	2380 (66.4)
Vacuum-assisted	92 (2.6)
Fundal pressure maneuver [a]	162 (4.5)

[a]Fundal pressure applied once in 64 (39.5%), twice in 69 (42.6%) and ≥3 times in 29 (17.9%)

TABLE II.—*Feto-maternal characteristics in singleton vaginal deliveries.*

Parameter	SVD N.=2088 N. (%)	VE N.=89 N. (%)	FP N.=162 N. (%)	P value
Age (years) (mean±SD)	31.0±5.5	31.6±5.5	31.0±5.5	0.67
Nulliparity	978 (46.8)	68 (76.4)	136 (84.0)	<0.001
Induction	499 (23.9)	30 (33.7)	53 (32.7)	<0.01
Gestational age at delivery (weeks) (mean±SD)	39.2±2.4	39.7±1.5	39.5±2.3	<0.001
Length of 2nd stage (minutes) (mean±SD)	27±26	76±45	67±43	<0.001
Average birth weight (g) (mean±SD)	3244±579	3281±461	3327±540	0.1

TABLE III.—F*eto-maternal outcome in relation to assistance in vaginal delivery.*

Parameter	SVD N.=2088 N. (%)	VE N.=89 N. (%)	FP N.=162 N. (%)	OR[a] (95% CI)	OR[b] (95% CI)	OR[c] (95% CI)
Metabolic acidosis	27 (1.3)	10 (11.2)	8 (4.9)	8.42 (3.3-21.1)	2.84 (1.1-7.1)	0.37 (0.1-1.01)
Apgar score <7 at 1'	75 (3.6)	15 (16.9)	11 (6.8)	13.19 (5.9-29.4)	2.59 (1.1-5.9)	0.20 (0.08-0.5)
Apgar score <7 at 5'	22 (1.1)	0	2 (1.2)	NA	1.96 (0.3-10.9)	NA
Episiotomy	250 (12.0)	14 (83.1)	101 (62.4)	22.7 (12.2-42.1)	6.52 (4.4-9.5)	0.29 (0.1-0.5)
Severe tears (≥2nd degree)	636 (30.5)	13 (14.6)	46 (28.4)	0.26 (0.1- 0.4)	0.65 (0.4-0.9)	2.51 (1.25-5.0)

[a]OR for VE (reference SVD); [b]OR for FP (reference SVD); [c]OR for FP (reference VE)

age (episiotomy/tears). Both groups of vacuum and FP assisted deliveries were associated with more frequent use of episiotomy and severe tears: the comparison between these latter groups showed a reduced prevalence of episiotomy (OR 0.29, 95% CI 0.1- 0.5) and a higher rate of severe tears (OR 2.51, 95% CI 1.25- 5.0) in the FP group.

In modern obstetrics, the ready availability of forceps/vacuum and the increased safety of caesarean section have made use of FP less common in routine practice.

Although very limited data exist, surveys suggest that in a high percentage of medical institutions obstetricians still recur to manual force in order to speed delivery. According to studies published in the '90s, the maneuver was practiced in 23% of vaginal births in a European university hospital as well as in more than 80% of institutions in the United States. [4,5]

Assisting actively labour with FP still occurs in many Italian delivery rooms, in association with high caesarean section rates and scarce operative vaginal deliveries.

Perhaps as a reflection of the controversial nature of FP and because of widespread criticism in the scientific community, we have observed a reluctancy among the assisting obstetricians and midwives to document the procedure. In spite of the tendency to keep the maneuver off-the-record and to conceal its use, we believe our results represent an accurate estimate.

According to our results uterine FP during the 2nd stage of labor is often used as a surrogate of vacuum delivery, which remained at the very low rate of 2.6%. The maneuver was used with the same clinical indications of a vacuum application: fetal distress, failure to progress in the second stage, maternal exhaustion.

Concerning the potentially dangerous effects of the maneuver over neonatal and maternal outcomes, our data suggest that FP shared a similar impact with vacuum upon neonatal metabolic balance even though the Kristeller maneuver caused fewer cases of metabolic acidosis and of low Apgar score.

As for maternal outcome, the perineal trauma was less severe after a spontaneous vaginal delivery than among women assisted either with VE or Kristeller maneuver. A large use of episiotomy was observed in both these groups, but mainly whenever vacuum was applied, and as a consequence severe tears were more frequent in patients assisted with FP.

In conclusion, according to our study, FP is still commonly performed in our delivery rooms proving that Italian obstetric attitude is still anchored to traditional practices. Effective measures ought to be implemented in order to perform the best operative intervention and achieve a safe vaginal delivery. We believe that in first place, adequate training should be offered to the younger generations of midwives and junior officers, in order to acquire the necessary skills to perform evidence based procedures with transparency as a mandatory requirement.

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