

CHANGES IN THE BISHOP SCORE INDUCED BY MANUAL NIPPLE STIMULATION. A CROSS-OVER RANDOMIZED STUDY

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Summary: Bishop score changes, by a cross-over, randomized study, were evaluated in 60 primigravidas at term, not yet in labour, who performed nipple stimulation for 45 minutes three times a day for three days.

Results showed that changes of Bishop score in the treated groups were statistically highly significant, in comparison to control groups.

A greater frequency in the onset of labour was also remarked.

INTRODUCTION

Several Authors (^{1,2}) recently reported that nipple stimulation, carried out at the end of the pregnancy for sixty minutes, three times a day for three days, can produce favourable modifications of the uterine cervix which are properly evaluated by Bishop score changes (³).

It is well known that successful induction and duration of labour are strictly related to the degree of the cervical ripening (^{3,4,5}).

Numerous methods have been proposed to modify cervical conditions at term.

Nevertheless, a suitable procedure, without risk for the fetus has still not been chosen, justifying the investigation for non invasive and easily feasible techniques for the patient herself, such as nipple stimulation.

Therefore, we observed the changes of the Bishop score induced by nipple stimulation in a group of primigravidas at term, not in labour.

MATERIAL AND METHODS

Bishop score changes were evaluated in 60 primigravidas.

Patients' ages were from 25 to 30 years. (Mean: 27.6 years).

Gestational age was from 38 to 40 weeks. (Mean: 39 weeks).

In all the patients, antenatal courses were uncomplicated.

Patients were recruited randomly in two groups, named "T" and "C". The women in "T" performed nipple stimulation, while "C" was a control group.

Bishop score was defined for each patient at the beginning of the treatment (Tab. 3), and then checked by the same clinician, three and six days later.

Patients in group "T" were trained to perform unilateral, manual, gentle nipple stimulation for 45 minutes, three times a day for three days.

Patients in group "C" were asked to avoid any nipple or breast stimulation.

Table 1. - *Gestational age.*

	Gestational age (weeks)		
	38	39	40
Group "T"	7	14	9
Group "C"	8	11	11

Table 2. - *Patients age.*

	Patients age (years)		
	25/26	27/29	29/30
Group "T"	9	13	8
Group "C"	11	9	10

Table 3. — Bishop scoring used in this study.

Parameter	Points		
	0	1	2
Dilatation	0 cm	1-2 cm	3-4 cm
Effacement	0-30%	40-50%	60.7%
Consistency	Firm	Medium	Soft
Position	Posterior	Axial	Anterior
Station	-3	-2	-1

Bishop score changes were evaluated in both the groups after three days.

Then a cross-over study was done.

Patients in group "T", who had not experienced labour, were asked to avoid nipple and breast stimulation for three days, while women in the group "C" (out of labour), were urged to stimulate their nipple according to the previously reported procedure.

Six days from the beginning of the treatment, patients in both groups were examined for changes in the Bishop score.

Once a day, during the study, fetal heart rate and uterine activity were recorded on a Hewlett-Packard 8040 A cardiotocograph.

Mean values and standard deviation of Bishop score were evaluated for both groups at the beginning and at the end of the treatment.

Initial conditions of the uterine cervix were indicated as "T1" and "C1", while finals were "T3" and "C3".

After cross-over, a similar procedure was done for the other two groups.

Previous group "C" was named as "T4" at the beginning, and "T6" at the end of the treatment, while the previous group "T" was named as "C4" and "C6".

Moreover, the analysis of the mean square deviation was done between "T3" and "T1", "C3" and "C1", "T6" and "T4", "C6" and "C4", regarding as statistically significant $p < 0.01$ and $p < 0.05$.

Delivery procedure, Apgar score at 5' and fetal outcome up to five days from the birth, were also evaluated.

RESULTS

The Bishop score at the beginning of this study was 3.36 ± 1.066 SD for "T1" and 3.433 ± 1.73 SD for "C1" group.

Three days after, the Bishop score in the treated group increased to 5.433 ± 1.194 SD, while in the control group

only a slight increase took place, so that Bishop score was 4.03 ± 0.85 SD.

Variation was about 2.07 in the treated group, but only 0.6 in the control group.

The analysis of the mean square deviation shows statistically highly significant variations of the Bishop score in the treated group ($p < 0.01$).

However, using a lower level of significance, e.g. $p < 0.05$, in the control group, Bishop score changes were also statistically significant, even though in a different way (Tab. 4).

In the first part of this study, the changes in the Bishop score of group "C4", previously named "T" where demonstrated.

This group was formed of 18 patients who had not experienced labour and had avoided any nipple or breast stimulation.

The Bishop score was also evaluated in the "T4" group, previously named "C", formed of 28 patients trained to nipple stimulation according to the previously reported procedure.

In this group, the Bishop score after nipple stimulation increased by about 2.8214, from 4 ± 0.861 in "T4" to 6.8214 ± 1219 SD in "T6".

In the control group, the Bishop score increased by about 1.056, from 4.72 ± 0.895 SD in "C4" to 5.777 ± 1.437 in "C6".

The analysis of the mean square deviation proved to be statistically highly significant ($p < 0.01$) in the treated group.

In the control group, the Bishop score changes were also statistically highly significant ($p < 0.05$), even though in a different way, as above (Tab. 4).

In 28 patients (42.85%) who performed nipple stimulation, the onset of labour was remarked.

In the control group, only 4 patients (22.22%) experienced the onset of labour.

Neither uterine hyperstimulation, nor cardiotocographic modifications were recorded after nipple stimulation.

Table 4. - Analysis of mean square deviation.

	T1	T3	C1	C3	T4	T6	C4	C6
Patients	30	30	30	30	28	28	18	18
Mean	3.3667	5.4333	3.4333	4.0333	4.0000	6.8214	4.7222	5.7778
Mean square deviation	1.1368	1.4264	1.1506	0.7230	0.7407	1.4854	0.8007	2.0654
Standard deviation	1.066	1.194	1.073	0.850	0.861	1.219	0.895	1.437
Degrees of freedom	59		59		55		35	
Degrees of freedom of the numerator	1		1		1		1	
Degrees of freedom of the denominator	58		58		54		34	
F	49.48 **		5.7644 *		100.1230 **		6.9977 *	

* $p < 0.05$ ** $p < 0.01$

All the patients had vaginal delivery. The newborn had an Apgar score after five minutes from 8 to 9, and a satisfactory outcome.

DISCUSSION

As previously reported (^{5, 6, 7}), duration and successful induction of labour are strictly related to the degree of the cervical ripening.

Patients with an unripe cervix show an increase of maternal and fetal morbidity, whether for prolonged labour or for need of operative delivery (^{3, 4, 5}).

Nipple stimulation, performed in the third trimester of pregnancy, can provoke oxytocin release from the pituitary gland by stimulation of hypothalamic supraoptic and paraventricular nuclei.

Finley *et al.* (⁸) remarked that serum oxytocin levels, although lower than 1 $\mu\text{UI/ml}$, were statistically highly significant.

The increase of uterine contractility is strictly related to serum oxytocin levels. This finding allowed the use of oxytocin stress test by nipple stimulation as a suitable method to evaluate fetal-placental reserve (^{8, 9, 10}).

Modifications in cervical ripening and spontaneous onset of labour suggest the

possibility of the use of nipple stimulation to ripen the cervix (^{1, 2, 8, 9}).

In the present study, patients underwent favourable modifications of the cervical ripening after nipple stimulation, with a Bishop score increase of about 2.06 in the first group and of about 2.82 in the second.

In the control group, Bishop score increased to 0.6 in the first part of the trial, while it increased to 1.05 during the second section.

The changes in the Bishop score in the groups "T1"/"T3" and "T4"/"T6" were statistically highly significant.

It is important that Bishop score changes were significant in the control group too, both for the lower level of significance and for remarkable differences in the statistical results (Tab. 4).

Therefore, variations observed in the control group can be considered as a "normal" variability of the Bishop score in a group of patients at term.

Cervical modifications by nipple stimulation are scarcely influenced by initial conditions of the uterine cervix, as shown by the increase in the Bishop score in "T4"/"T6" (2.82) a little higher than in "T1"/"T3" (2.06).

Cervical modifications, however, seemed to be associated with the treatment period, since there were not changes in the groups "C4"/"C6" after three days of treatment.

Our previous experience⁽¹⁰⁾ showed that uterine hyperstimulation is more frequent with a bilateral procedure, so, according to other Authors⁽⁹⁾, bilateral nipple stimulation was carefully avoided, preventing hyperstimulation.

The mean frequency of onset of labour in both the treated groups was about 41%, instead of 45% reported by Elliott⁽¹⁾ and 36% reported by Salmon⁽²⁾.

Changes in the Bishop score in our patients were a little lower than in other studies^(1, 2, 8), maybe because of stimulation time, 45 minutes instead of 60 minutes.

How nipple stimulation can cause changes in the cervical ripening is still not perfectly understood.

The increase in serum oxytocin levels surely plays an active role in the cervical priming at term, even though other hormones can be considered, as prostaglandins.

Nipple stimulation, a non invasive, safe method easily performed, can surely be considered as an elective procedure to assist cervical ripening in physiological con-

ditions, especially in women who prefer natural techniques of labour induction.

We also believe it would be useful to evaluate other protocols for the monitoring of high risk pregnancies.

Strict cardiotocographic controls for the safety of both mother and fetus must be performed in these experiences.

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