

THE SECOND STAGE OF LABOR*

III. Number of Pains

L. A. CALKINS, M.D., PH.D., KANSAS CITY, KANSAS

(From the University of Kansas Medical Center)

SOME years ago, we suggested to our house staff that whenever there was doubt as to completeness of dilatation of the cervix, a vaginal examination, under aseptic technique, should be done. This resulted in a lessened frequency of prolonged second stage in our clinic. There was still remaining, however, a higher incidence in the clinic patients than was being observed in our private patients. We, therefore, made it a rule that a vaginal examination should be done when the head did not reach the pelvic floor within thirty minutes after the cervix had been thought to be completely dilated. (We had always operated in the belief that the cervix should not be considered to be completely dilated until it had completely retracted over the head.) It was very apparent, after the initiation of the above rule, that the final stages of cervical retraction were often very slow in the presence of poor labor pains in primiparas. It was also very apparent that a partially retracted cervix could not be palpated, in the anterior half of its circumference, by rectal touch.

Another survey of our records, a little more than a year ago, showed an almost complete absence of prolonged second stage. There was still, however, a marked variation in the duration of this part of the labor. While most of the patients, both primiparas and multiparas, had a quite short second stage, there was still a considerable number of primiparas in whom the second stage exceeded one hour. A survey of the latter group, separated from the larger fraction of the patients, showed a remarkably high incidence of long interval between pains (four to as much as eight minutes). We immediately wondered whether the prolonged second stage could not be partially explained on the basis of this long interval. We had previously found¹ that intensity of uterine contractions was a highly important item in the duration of the second stage. It is quite apparent to everyone that pains of good intensity are usually close together. It is also evident that pains at infrequent intervals are usually of poor intensity. Since there is no simple method of measuring intensity of uterine contractions accurately,[†] it was difficult to tell whether intensity or frequency was the more important consideration. The very fact that the results were measured in minutes introduced a third variable—time. It occurred to us, therefore, that we should, perhaps, try to eliminate both the frequency factor and the time factor from our consideration. This could very readily be done, if we noted the intensity of the pains, and then counted the number of pains, and used as our measure of the duration of the second stage the number of pains,

*Published in the American Journal of Obstetrics and Gynecology 57: 106, 1949.

†We have called contractions during which the uterus cannot readily be indented at the height of a contraction as "good", in comparison with contractions during which the uterus is readily indented, which we have called "poor."

instead of the number of minutes. This is very logical, since fifteen pains at four-minute intervals, thereby consuming one hour, should not logically be expected to accomplish more than fifteen pains at two-minute intervals, which would consume only half as much time. It should be noted here—somewhat parenthetically—that fifteen pains at one-minute intervals do not actually accomplish as much as fifteen pains at two-minute intervals. This is probably due to an insufficiently long period of relaxation, and might be considered as sub-clinical tetany.

In the last year and a half, since the above plan was adopted, the vast majority of our records contain the number of pains, in addition to the previous data theretofore included. Not always has the vaginal examination been made, although there has developed somewhat of a tendency to examine most patients by vagina if the head does not reach the perineum immediately after the cervix is thought to be dilated. We have not discouraged this tendency, because, in a teaching clinic, we feel it highly important to impress upon everyone that such is the normal course of events.

TABLE I. STATION AT COMPLETION OF DILATATION

NO. OF PATIENTS	ON PELVIC FLOOR		ABOVE	
	NO.	PER CENT	NO.	PER CENT
Primiparas 790	558	71	232	29
Multiparas 1178	909	77	269	23

Among 790 primiparas with occiput presentations (Table I) the head was found to be on the pelvic floor at the time the cervix was completely dilated in 558 patients (71 per cent). In 59 others, the head reached the pelvic floor either before or during the course of the next uterine contraction. In other words, the head was on the perineum at the time the cervix was dilated, or with the next pain, in a total of 617 out of 790 primiparas (78 per cent). Similar figures for multiparas showed 909 of a total of 1178 on the perineum at the time the cervix was dilated (77 per cent). One hundred sixty-four others reached the perineum on or before the completion of the next contraction. A total, then, of 1073 of the 1178 multiparas had the head on the perineum at the completion of dilation, or within one pain thereafter, (91 per cent). One cannot help but wonder whether the strictly normal course of events does not call for the head being on the perineum at the time the cervix is completely dilated. One cannot, however, reason conversely that the head on the perineum means complete dilatation, as we see a definite percentage of our patients with the head on the perineum for a considerable time before the cervix is completely retracted. Two to three per cent of all patients show this. In one group (primiparas with poor first-stage pains), 8 per cent will have the head well down on the perineum by the time there is 7 to 9 cm. dilatation.

We have previously urged² that the second stage be considered as being composed of two phases: one, a descent phase, and two, a pelvic floor phase. From the above, it is quite apparent that at least 70 odd per cent of both primiparas and multiparas have the head on the perineum at the time the cervix is completely dilated. These patients have only a pelvic floor phase in the second stage. The remaining 20 odd per cent, of both primiparas and multiparas in this present series, did not bring the head to the pelvic floor for a variable time after the cervix was completely retracted. As will be shown, the number of

pains required to complete this descent phase varied from none to ten. Following completion of descent, these patients then had the same pelvic floor phase characteristic of the larger group. The total duration of the second stage for this smaller group, who had both a descent phase and a pelvic floor phase, cannot logically be compared directly with the total duration of the larger group, which had only a pelvic floor phase.

TABLE II. PRIMIPARAS, DESCENT PHASE

NUMBER OF PAINS	0-1	2-4	5-10	OVER 10
Good pains	32 per cent	37 per cent	31 per cent	
Poor pains	23 per cent	42 per cent	33 per cent	2 per cent

Study of the descent phase in the 232 primiparas (Table II), showed that the descent was a bit more rapid with good pains than with poor ones but that, even with poor pains, all had reached the pelvic floor in ten pains or less. Two per cent—a total of three patients only—according to the records, showed 13, 15, and 20 descent-phase pains, respectively. In none of these three patients were the pains actually counted, but only “estimated,” and in none of the three was a vaginal examination done. Critical review of these three records would seem to indicate that only the last one of the three probably had more than ten pains to reach the pelvic floor. In the 269 multiparas (Table III), the vast majority had reached the pelvic floor within six pains, and all save two patients had reached the pelvic floor within ten pains or less. One of these two patients was “estimated” to have had fourteen contractions in her descent phase, and the other one sixteen. No vaginal examination was made in the first, and the record is uncertain as to whether a vaginal was made in the second. Assuming that the second patient did actually have more than ten pains in her descent phase, we then have one primipara out of 790 and one multipara out of 1178 who required more than ten pains to reach the pelvic floor after complete dilation of the cervix.

TABLE III. MULTIPARAS, DESCENT PHASE

NUMBER OF PAINS	0-1	2-4	5-10	OVER 10
Good pains	67 per cent	29 per cent	4 per cent	
Poor pains	57 per cent		13 per cent	1 per cent

As stated above, the pelvic floor phase of those patients having a descent phase was in no way different from the larger group, who had no descent phase. The 1174 multiparas (Table IV) were found to have completed the pelvic floor phase in the vast majority of cases in about three pains, and in virtually all instances in ten pains. Again, good pains accomplished the end result more quickly than poor pains, but the difference between good pains and poor pains was not nearly so marked as we had previously thought, further emphasizing the value of pain measurement over minute measurement. Eight patients only (less than 1 per cent of the total), according to the records, required more than ten pains. (One patient, previously delivered by cesarean section and, therefore, a primipara for purposes of this discussion, was also inadvertently included in Table IV.) Six of these eight patients were said to have had 12, 13, 13, 14, 14, and 15 pains, respectively. The duration in minutes of the second stage in these same patients was 20, 20, 24, 28, 28 and 30 minutes. In most instances, the pains were not actually counted, but the number only estimated.*

*While the house staff has been very diligent in counting the pains, it is only natural that they should forget occasionally. As a matter of fact, intern and resident usually keep separate count, and when they disagree, an estimate is the result.

In at least three of the six patients, no vaginal examination was done. In three cases, the pains were said to be one to one and one-half minutes apart, which, as noted above, is not a desirable situation. It seems doubtful whether any of these six patients had materially more than ten pains in her pelvic floor phase. The remaining two patients certainly had more than ten pains.

TABLE IV. MULTIPARAS, PELVIC FLOOR PHASE

NUMBER OF PAINS	0-3		4-6		7-10		OVER 10	
	NO.	PER CENT	NO.	PER CENT	NO.	PER CENT	NO.	PER CENT
Good pains 602	470	78	100	17	31	5	1	0
Poor pains 572	386	67	135	24	43	8	8	1

One, a twenty-five-year-old gravida ii, para i, had the head on the perineum three minutes after completion of dilation (one pain), and delivered spontaneously thirty-six minutes later, after eighteen pains. She was normal in all respects; the baby weighed 3,640 Gm.; and the head was completely rotated at the time the head reached the pelvic floor. She was said to have had "very poor" pains. She had been given 2.5 mg. of Pontocaine in 0.5 c.c. of 10 per cent glucose intraspinally. We do not feel that this minimal dose saddle block materially reduces the effectiveness of second stage pains, but, like any other anesthetic, it does have some effect. The other patient, a thirty-year-old gravida ii, para i, required thirty-five minutes (ten pains) to reach the pelvic floor, at which time the head rotated posteriorly and was delivered after twenty-nine very poor contractions with the aid of low forceps. (It should, perhaps, be stated here that forceps were used only five times in the delivery of the 1174 multiparas.) According to this patient's history, this pregnancy terminated at the end of thirty-three weeks, and the attendant was quite surprised to find the baby weighed 3,100 Gm. This was quite readily explained, however, when it was noted that the placenta weighed 780 Gm. The infant did, throughout the neonatal period and for a considerable time thereafter, react like a premature infant—required incubator care, etc. While it is, therefore, possible for a multipara to require more than ten pains to deliver the baby over the perineum, it is of rare occurrence in this present series.

TABLE V. PRIMIPARAS, PELVIC FLOOR PHASE

NUMBER OF PAINS	0-10		11-20		21-30		OVER 30	
	NO.	PER CENT	NO.	PER CENT	NO.	PER CENT	NO.	PER CENT
Good pains 302	242	80	60	20				
Poor pains 488	269	55	175	36	39	8	5	1

The survey of the pelvic floor phase in primiparas also produced very interesting data. Three hundred two of these primiparas (Table V) were said to have good second stage pains. Two hundred forty-two (80 per cent) of these were delivered within ten pains or less. The remaining 60 (20 per cent) were delivered in most instances in fifteen pains or less, and in all cases within twenty pains or less. Only five of the 302 patients had forceps deliveries, thus reflecting our previously gained confidence that primiparas with good pains will promptly deliver themselves spontaneously. Two of these five forceps cases might have had a few more than twenty pains had the forceps not been used. One can, however, say very confidently that all primiparas, with good pains, will deliver themselves over the perineum in twenty pains or less.

Four hundred eighty-eight primiparas were said to have poor second-stage pains. A little more than half of these patients were delivered in ten pains or less. Another thirty-six per cent were delivered in the second ten-pain period. Eight per cent required twenty-one to thirty pains, and 1 per cent—5 patients—

required more than thirty pains. Three of these five patients were eventually delivered with forceps, and all of them required more than an hour, except one, who was delivered at the end of forty-six minutes. The incidence of forceps in this poor-pain group is as follows: of the 269 patients delivered in the first ten pains, 39 were delivered with forceps; and 17 of the 175 in the eleven to twenty pain group were similarly managed. This relatively higher rate of forceps exhibition is the result of our previously gained impression that primiparas, with very poor pains, are quite unlikely to deliver themselves spontaneously in a reasonable period of time. This present study has gone a long way toward establishing the contradiction of that idea, since 444 (less a few of the forceps cases) are shown to have delivered themselves within 20 pains or less. Of the remaining 44 patients, 39 were delivered between 21 and 30 pains, six of these by forceps. Five had more than 30 pains, and three of the five were delivered by forceps. It seems, on the basis of this study, that it is rather futile to expect a patient to deliver herself spontaneously if she has not done so within thirty pains. It should be noted, however, that the five patients having more than thirty pains in this present series constitute only 1 per cent of those having poor pains, and slightly more than one-half of one per cent of the total number of primiparas. Similarly, it might be noted that the 44 patients having more than twenty pains constitute about 5 per cent of the total number of primiparas.

Discussion

In other words, the primipara, with pains at two-minute intervals, will nearly always have delivered herself within forty minutes. The primipara, with pains at three-minute intervals, can be expected to deliver herself within one hour. The primipara, with pains at four-minute intervals, will naturally require up to eighty minutes, even if the individual pains are of good intensity.

Conclusions

1. Complete retraction of the cervix as a measure of the end of the first stage, or of the beginning of the second, leads to a better understanding of the physiology of the second stage and a better clinical judgment of its progress.

2. Measurement of the duration of the second stage by number of pains, rather than by number of minutes, is more logical and, in our hands, a much more satisfactory method of measurement.

3. Most primiparas can be expected to deliver themselves spontaneously, after the head reaches the perineum, in twenty pains or less.

4. A simple second-stage formula might be stated as follows:

All patients, primiparas and multiparas, will complete their descent phase in ten pains or less.

All multiparas will complete their pelvic floor phase in ten pains or less.

Primiparas, with good pains, will complete their pelvic floor phase in twenty pains or less. Primiparas, with poor pains, will complete their pelvic floor phase, in nearly all cases, in thirty pains or less.

References

1. Calkins, L. A.: *AM. J. OBST. & GYNEC.* 53: 488, 1947.
2. Calkins, L. A.: *AM. J. OBST. & GYNEC.* 48: 798, 1944.

Discussion

DR. ROBERT A. ROSS, Durham, N. C.—In a recent study at Duke University a listing was made of the number of pains rather than judging labor in terms of hours or minutes. The results are in accord with Dr. Calkins' observations. We have long held the thesis that, perhaps, the best way to teach obstetrics is to have the student sit by the laboring woman's bedside with his hand on her abdomen. In this way, he can judge not only the duration and interval of the pains, but also their intensity. From the observations of Rucker, Murphy, and Torpin, we know that pains may not be productive. They also showed that the rest period between pains was just as important as the pain itself. The essayist has re-emphasized this point. We must also recall the behavior of the uterus in prematurely induced labor as compared to normal labor.

Another point is the inability to judge the dilatation and, more important, effacement of the cervix by rectal examination alone. Surely, in our efforts to teach asepsis, we do not examine our patients by the vagina often enough to evaluate properly the behavior of the cervix. Too often when the patient is on the delivery table and asleep, only a thin or not completely dilated cervix is present. The essayist properly calls for an examination by vagina whenever the patient has not brought the baby to the vulva after a period of hard pains. He also distinguishes between a patient who has the fetal head well in the pelvis, without pain, when the labor may be inordinately long and perplexing, and the patient who starts labor with the head unengaged and carrying on in fine fashion.

The incidence of forceps delivery is noteworthy and no doubt springs from listing the number of pains rather than time of labor. Several years ago we had our resident in a general hospital, list the time of day, or night, of all forceps deliveries. The result was as expected. The tired, harassed doctor delivered more patients by forceps before mealtime, bedtime, and office-hour time than at any other. The essayist's observations should help in anticipating the time of birth.

DR. PHILIP F. WILLIAMS, Philadelphia, Pa.—Dr. Calkins' studies of the progress of labor which he has presented in recent years have been of much interest. In the present essay he has offered us a very simple rule by which one can measure numerically by contractions the degree of effort needed to bring about descent and expulsion of the fetus. It might seem worth while to substitute the formula which he has derived from a fairly large sampling of patients for the time-honored formula of two hours in what we have regarded as the second stage, or thirty minutes with the head on the perineum and no progress, to indicate the necessity for artificial delivery.

I am uncertain, however, as to whether this group of nearly 2,000 women represents a selected group of consecutive cases. No mention has been made of borderline cases. Again, the age of the patient or physical condition, the size of the baby, and the fetal position do not seem to have occasioned any delay. All these factors would seem to occasion more marked variation from the conclusions as to the muscular effort required for descent and expulsion. The incidence of forceps deliveries in the group reported is indeed quite low.

Dr. Calkins' indication for making a vaginal examination is excellent. Certainly, rectal examinations are inconclusive in many instances in determining if the cervix has retracted over the head. The ease of rectal examinations and the avoidance of preparation of both patient and physician and a possible slight increase in morbidity in vaginal examinations possibly make us a little lazy in determining the exact state of the cervix. Very often when the cervix is felt by rectal examination to be fully dilated and then vaginal examination is made we find a very thin cervix, 6 or 8 cm. dilated and probably having very little muscular fiber in it. In reality, the muscular cervix has retracted over the head and the thin mucous membrane layer is still present and retracts on almost the slightest stretching or pushing. The obstructing anterior cervical lip, when pushed over the head and held there during one pain, is often followed by almost immediate delivery.

A large series of healthy, native-born American women in good nutrition and condition, with no pathologic processes, would probably deliver themselves spontaneously in a manner equal to the series Dr. Calkins has reported. But I think we would find in an extensive practice of mixed nationalities, fearful of labor, elderly so far as the first pregnancy is concerned, and demanding and receiving many of the widely prevalent methods of sedation or anesthesia, that their necessary effort to complete the second stage would come far beyond the number of pains in Dr. Calkins' series. I would be interested to know if Dr. Calkins regards the women who had more than thirty pains in the pelvic-floor phase to have had secondary inertia, and if any of his patients could be considered as having had primary inertia.

If we must examine a woman vaginally to determine complete retraction of the cervix as a determination of the physiologic end of the first stage, which is an excellent suggestion, we will probably have a large increase in the number of vaginal examinations to determine the progress of labor, but if we adopt the formula suggested we may not have as many forceps deliveries as are practiced in many clinics.

DR. RUDOLPH W. HOLMES, Charlottesville, Va.:—In 1893, Kroenig and Ries independently wrote articles which extolled the merits of rectal examinations in labor. The history of rectal examinations is an interesting one. Textbooks and journal pages gave scant publicity to their advantages, so that from 1893 to 1915 there was not one formal paper on the subject. Yet, the procedure became a near routine throughout the world without the aid of publicity; its growth was insidious. I wrote a paper in 1915 on the advantages of rectal examinations, based entirely upon my experience as a routine in my own work, and as a method required by my subordinates in various hospitals. To the latter, a vaginal examination was barred except on a special permission.

I do not believe I am prejudiced in its favor—I merely express an opinion based upon my own experience. I still believe that rectal examinations will elicit all needful information in the vast majority of cases; when a failure does occur, usually it will be found that the findings from a vaginal touch will be equally futile; when this does happen, manual examination through the vagina may be imperative. I believe that most antagonists to the method have not given the method a full trial. Abdominal palpation and rectal touch are without danger; vaginal examinations do carry a menace from infection. I express myself strongly as the essayist reflects an unfortunate retrogressive trend as regards methods of investigation.

DR. CALKINS (Closing).—Of course, this was not a paper on the first stage of labor and therefore did not deal with the retraction of the cervix. It was not a paper on anesthetics but these patients did have some form of analgesia as well. Too much anesthesia will prolong labor, it should be stated—both first and second stages—and where we have used too much anesthesia a longer labor has been the result.

This was not an attempt to substitute vaginal for rectal examinations. I quite agree that up to the final stages of dilatation the patient may be very properly and appropriately handled by means of rectal examinations, but my point was that in many instances the cervix is thought to be properly dilated when it is not and I believe a vaginal examination is less dangerous than forceps delivery.