

THE SECOND STAGE OF LABOR—THE DESCENT PHASE*

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

(From the Kansas University School of Medicine)

SOME years ago, we endeavored to demonstrate that the first stage of labor was a very simple process, controlled by the frequency and intensity of labor pains balanced against the resistance offered by the cervix.¹ The passenger, either with respect to its size or its presentation, had no effect on the progress of the first stage. With the possible exception of ruptured membranes, nothing other than labor pains and cervix was of any major importance.

A similar study of the second stage of labor reveals quite a different situation. Here, we find a very complicated process, affected by many different considerations. Voluntary effort of the patient is of as much, if not greater, importance than the involuntary contractions of the uterus. Ruptured membranes facilitate descent, but may act as a deterrent factor in negotiating the pelvic floor. Size of the passenger is of considerable importance, particularly in primiparas. Presentation is of little importance in some respects, but a definite factor as regards internal rotation. The station at which internal rotation takes place has a definite bearing on the rapidity and ease of delivery. The frequency and intensity of labor pains are of relatively little moment in multiparas, but a factor of considerable importance in primiparas.

Since there are so many factors involved and since these factors are more or less interdependent, clarity of understanding will be served by discussing only one of them at this time. The remainder of this discussion will concern itself with that phase of the mechanism of labor known as descent.

The textbooks give one the impression that descent, while partial in the first stage, is a more or less continuous process during the second stage of labor. In the present series of some, 2,400 primiparas and 1,700 multiparas, our findings are not quite in accord with this impression. In something over half (54 per cent) of all patients, the head was definitely on the pelvic floor at the time the cervix receded over the head. It has been our custom to say the cervix was completely dilated only when it was also completely retracted. Very frequently, there is no descent when the cervix is seemingly dilated but still palpably present around the head. Palpation at the height of the uterine contraction will show this remaining rim of cervix to be tightly clamped against the head and to be preventing descent thereof. As soon as the cervix is retracted, the head will frequently almost fall

*Published in the American Journal of Obstetrics and Gynecology 48: 798, 1944.

down through the pelvis to the perineum. Conversely, the head may be on the pelvic floor for a matter of minutes or even hours before dilatation is complete. The assumption that the patient is in the second stage of labor merely because the head is on the perineum may well lead to the impression that forceps delivery will be required because of "lack of progress." In these patients in particular, it is unsafe to depend upon the findings by rectal examination, and it has been our custom for the past few years to do vaginal examinations routinely under these circumstances (i.e., head on perineum with no progress).

In this group of patients, with the head on the perineum at the time dilatation is complete, the second stage is wholly concerned with the negotiation of the pelvic floor.

In the remaining patients (something less than half of all cases in the present series), the presenting point is at a somewhat higher station at the time dilatation is completed. This station may vary all the way from approximately 1 centimeter above the pelvic floor to a point well up in the pelvis. *In this latter group of patients, descent to the pelvic floor must precede the pelvic floor phase.* This descent may require all the way from a very few minutes to as much as an hour or more. After it is completed, there then remains the pelvic floor phase, which is exactly like the whole of the second stage in the first group of patients. It has seemed advisable to us when referring to the second stage in this second group of patients to speak of "Descent Phase" and "Pelvic Floor Phase." The duration of the second stage in this group cannot be directly compared with the second stage in the first group. Failure to make this differentiation inevitably leads to inaccurate judgments as to the proper amount of progress in individual patients and, therefore, to ill-advised abstinence from operative delivery in the first group and ill-advised early interference with the second group.

Etiology of High Station

Since more than half of all patients in this series had the head on the perineum at the time dilatation was complete, it becomes of interest to try to determine the etiology of the high station in the smaller group.

One major factor (the cervix and lower uterine segment), one somewhat less important factor (the time of rupture of the membranes), and

several almost negligible factors seem worthy of consideration. It is quite apparent that the cervix and lower uterine segment are much stretched and markedly thinned out before the onset of labor in a small proportion of patients. Some of these individuals are observed to "carry their babies on their heels" for the last several weeks of their pregnancies. Considerably more frequently, one observes the head descending through the pelvis during the first stage so that it may reach the pelvic floor by the time the cervix is only 5 or 6 centimeters dilated. Stretching of the lower uterine segment (and parametrial tissues?) would, therefore, seem to precede effacement and dilatation of the cervix in a small number of individuals, and to proceed apace in a considerable fraction of the remainder. Failure of stretching of the lower uterine segment and cervix would naturally prevent descent of the head until the cervix is completely dilated and, therefore, completely removed as an obstructive factor to descent. As nearly as could be judged from this present series of patients, 33 per cent of all individuals fall into this category. In this 33 per cent of patients, the station of the head is high at the time dilatation is complete regardless of all other factors in the individual.

The next most important consideration is the time at which the membranes rupture. Of 2,397 patients whose membranes had been ruptured previous to the completion of dilatation, 59 per cent (1,404 patients) had the head on the perineum at the time dilatation was complete. Of 1,185 patients in whom the membranes did not rupture until after the completion of dilatation, only 44 per cent (521) had the head on the perineum at the time dilatation was complete. That unruptured membranes can act as a deterrent to descent is particularly evident in multiparas whose pains are very poor, and who exert little or no voluntary effort. One patient in this series had complete dilatation for four hours with the head just above the pelvic floor and no progress. Rupture of the membranes was followed by birth of the baby within one minute and without a uterine contraction. The difference between 59 per cent and 44 per cent would suggest that late rupture of the membranes relative to the time of completion of dilatation is approximately a 15 per cent factor in preventing early descent.

Three other clinical findings were carefully studied and found to be unimportant or of negligible weight in determining station as of the time of complete dilatation. The presenting point in 52 per cent of primiparas was on the perineum, while in multiparas, 59 per cent was at a low station; 53 per cent of occiput anterior as against 51 per cent of occiput posterior; 55 per cent of the small and medium-sized babies and 50 per cent of the large babies (3,500 grams and over). Baby size alone, therefore, of these three factors might be considered as of minimum importance, and to be, at most, a 5 per cent factor. If we combine the factors favorable for a low station, namely, small and medium-sized multiparas' babies, with early rupture of membranes, we find that 66

per cent are on the perineum at the time the cervix is completely dilated; whereas, primiparas with large babies and unruptured membranes, have only 34 per cent on the perineum at the time the cervix is at complete dilatation. It is thus apparent that the resistance offered by the cervix is a very major factor in preventing early (first stage) descent; unruptured membranes are a considerable factor; and baby size, parity, and posterior occiput position are negligible—certainly so for the individual patient.

The Descent Phase of the Second Stage

The length of time necessary for, and the factors concerned in, descent occurring in the second stage are of considerable interest. (Table II.) Several factors are concerned with this process, but only two are of anything like major importance. It is not yet apparent whether the relative amount of voluntary effort exerted, or the relative intensity and frequency of the uterine contractions is the more important. It is quite apparent that patients with good pains coming at frequent intervals will bring about complete descent to the pelvic floor in an average of some twelve minutes in primiparas (multiparas—six minutes). Voluntary effort is unnecessary and relatively unimportant in this situation. On the other hand, if the contractions are quite weak and infrequent, good voluntary effort is almost a necessity and will frequently produce descent in ten to fifteen minutes. With average cooperation by the patient, descent requires an average of forty minutes, and with no voluntary effort may well require more than an hour. Since we do not have a precise method of measurement, we can only say that it is our present impression that voluntary effort is more important than uterine contractions, both with respect to the descent phase and the pelvic floor phase of the second stage of labor. This is more striking in multiparas than in primiparas.

Effectiveness of the uterine contractions can be somewhat more readily judged. Descent in primiparas with no obstructing factor and with good pains occurs in some twelve minutes. Where the pains are weak and infrequent, the pelvic floor may be reached in a few minutes, but may require forty minutes or more. The average in most such groups is thirty to thirty-five minutes. For purposes of comparison with the other factors involved, the labor pains could, therefore, be said to be a factor of twenty minutes or more.

Perhaps next most important is the size of the baby (occiput presentations only are being considered in this paper, and abnormal presentations are, therefore, automatically excluded). In primiparas, babies of 3,500 grams and over, require on the average some six minutes more for completion of descent (multiparas three minutes) than the average of small and medium-sized babies. Marked variations are observed, and it is not infrequent that large babies apparently descend more rapidly than small ones. These figures quoted are, therefore, to be looked upon only as averages or general tendencies. On this basis, largeness of baby could be said to be a six-minute factor.

In this group of patients, it was noted that if internal rotation took place during descent, that descent was completed on the average more rapidly than if internal rotation did not occur until after the presenting part was definitely on the perineum. Here again, the differential was about six minutes for primiparas, and three minutes for multiparas. This series is not sufficiently large for us to be certain whether this differential does not represent inadvertent selection. It may well be that some factor which inhibits internal rotation during descent also inhibits descent itself; as for example, the large size of baby above noted. In this connection, it was supposed by us that moderate degrees of deflexion would be found to be of considerable importance. Again, the size of the present series does not enable us to be certain that such is the case. At present, it would seem that deflexion of the head does not materially inhibit descent except when associated with large babies, and that it then does not particularly magnify the inhibition characteristic of the large-sized infant.

Occiput posterior descends as rapidly as occiput anterior, if the baby be of small and medium size. In the present series, occiput posterior averages for some rather large groups are actually less than occiput anterior averages. The large baby, however, with occiput posterior will show an average in excess of that of exactly comparable occiput anterior groups. The differential is four to eight minutes for primiparas, and zero to six minutes for multiparas. It would seem to us that occiput posterior, as a deterrent of descent, can be entirely neglected in the individual patient, as the effect is too inconstant for individual patient consideration.

If the membranes are ruptured previous to the completion of dilatation and the head still remains high until dilatation is complete, it was found by us that descent was more rapid in the second stage than if the membranes were still intact while descent was taking place in the second stage. The differential here is approximately four minutes with good pains and as much as eight minutes for exactly comparable groups whose pains are poor. Previous rupture of the membranes, therefore, facilitates descent. It is interesting, however, that all this advantage is lost after the head reaches the perineum, and the total time consumed by the

descent phase and the pelvic floor phase (combined) becomes exactly the same for those with early and those with late rupture of the membranes.

Failure of descent was observed only twice in this series. There was no instance of contracted pelvic inlet interfering with descent. One patient cared for during this period had a pelvis sufficiently small that elective cesarean section was done. Some five or six patients had sufficiently small pelvic outlets that there was delay in the pelvic floor phase. In no instance was this of serious degree. The obvious delay produced by abnormal presentations, such as bregma or brow, is not discussed here, as these abnormal presentations were not included in this study. Hydrocephalus occurring during this period happened to be associated with brow presentation in every case. There were observed one case of markedly delayed descent and one case of failure of descent. The marked delay was brought about by a huge amount of scar tissue in the pelvis following a previous ischiorectal abscess. The failure of descent was the result of the baby being suspended in a loop of its own umbilical cord. After many hours of failure of descent, a high median forceps delivery resulted in rupture of the cord followed by an extremely easy forceps extraction. Complete failure of descent is so rare in our experience that we have come to the rather firm conclusion that apparent failure of descent or apparent delay in descent is almost exclusively due to the fact that the cervix is not yet quite completely dilated. It is, therefore, a rule in our clinic that if the head is not on the pelvic floor within thirty minutes of the time dilatation was thought to be complete, a vaginal examination is to be done. This will nearly always reveal a rim of cervix still holding the head at a high station. The patient is, therefore, still in the first stage of labor, and the second stage has not begun.

Reference

1. Calkins, L. A.: AM. J. OBST. & GYNEC. 42: 802, 1941.

KANSAS UNIVERSITY HOSPITAL

Discussion

DR. HOWARD C. MOLOY, New York, N. Y.—The observations and conclusions of Dr. Calkins' paper confirm the general accepted opinion in regard to the importance of cervical dilatation and retraction, and the role played by the membranes in labor. Some years previously, we were interested in this subject at the Sloane Hospital and in a few instances studied cervical dilatation and retraction by the use of lateral roentgenograms after lead shot had been fixed to the anterior and posterior lip of the cervix. Until complete dilatation of the cervix had been obtained, the shot did not elevate. As the head descended through the completely dilated cervix, however, the cervix apparently rapidly retracted, either by passive force or by pulling through action of the uterine muscles proper. It was surprising to note that the cervical rim in normal labor can be retracted as high as the plane of the pelvic inlet.

The second point which interests me is not mentioned in the paper; namely, the possible role of pelvic size and shape. I think this factor is too important to be completely ignored in any report pertaining to the study of labor. Dr.

Calkins states that, "It was noted that if internal rotation took place during descent, that descent was completed on the average more rapidly than if internal rotation did not occur until the presenting part was definitely on the perineum." He suspects a factor exists to explain this observation by stating, "It may be that some factor which inhibits internal rotation during descent, also inhibits descent itself, as for example, the large size of baby," but does not refer to the possible influence of pelvic shape and size. We believe that pelvic shape plays a decided role in determining the level at which internal rotation takes place. Sometimes this is due to the shape of the inlet.

Torpin reported at the recent meeting of the American Medical Association in Chicago an interesting paper on the role played by the placenta upon head position. He studied roentgenologically pelvic shape in twelve cases of spontaneous face to pubis deliveries. In at least one-half of these cases he found marked anthropoid pelves or pelves with converging side walls to explain the failure of internal rotation. In the remainder, the presence of a large pelvis led him to suspect that the position of the placenta may have been a factor in the cause of this mechanism.

In five or six cases in Dr. Calkins' report there was definite delay in the pelvic floor stage or at the outlet. Although, in these cases, delivery was effected without difficulty, I feel certain that pelvic abnormalities in the outlet contributed to the delay or arrest. I would like Dr. Calkins to comment upon the possible influence of the bony pelvis in those cases of delayed internal rotation and those few cases which experienced difficulty during the pelvic floor phase.

The question of the significance of deflection attitudes of the head has for years entered into most discussions concerning the mechanism of labor. The fact that the anterior fontanel can be easily palpated is used as an argument that deflection exists, yet stereoscopic films may show that the head actually is quite well flexed in regards to the pelvis. While I agree in general with Dr. Calkins, therefore, that deflection does not play a significant part in the mechanism of labor, I would be interested in the clinical methods he used to determine this point.

The third and final point of interest deals with the remarkably low incidence of operative deliveries in this large series of cases. Failure of descent was observed only twice in the series and in only five or six cases was there delay at the outlet. I believe the excellent results indicate attention to the intrapartum care of the patient, the careful use of analgesia with adequate fluid intake in cases of protracted labor to prevent the uterus and the forces of labor from losing their efficiency.

It is doubtful, if it is entirely justifiable to compare the operative incidence from widely separated hospitals inasmuch as racial stock is a very important factor. The number of operative deliveries increases in mixed populations and, in large cities, racial types differ, and abnormal physical types, which predispose to soft part and bony dystocia are not infrequently encountered. All of these factors must be considered in the appraisal of obstetrical statistics.

DR. NORRIS W. VAUX, Philadelphia, Pa.—We all, I think, are in accord that in about 50 per cent of our patients who present no abnormalities of the birth canal or fetal obstruction, the presenting part reaches the pelvic floor at the completion of the first stage of labor. The other 50 per cent of patients, those in whom dilatation may occur before the descent phase is completed or those in which the presenting part is on the pelvic floor before the cervix is completely dilated, are the ones in which we are particularly interested.

It has always been our custom at the Lying-in Hospital to instruct the nursing staff that until the cervix is fully retracted or completely dilated not to allow the patient to use any of the accessory muscles for expulsion or aiding in the descent of the vertex. In all probability the use of the accessory muscles along

with the uterine contractions causes the cervix to lacerate and the membranes to rupture before the hydrostatic action of the unruptured sac upon the cervix is completed.

Rupturing of the membranes before complete dilatation is still a disputed and controversial subject. Leaving the membranes intact, if possible, until the cervix is fully dilated when Nature by virtue of the uterine contractions alone causes spontaneous rupture is, I believe, the best method to pursue. Although the labor might be somewhat delayed throughout the second stage, it is quite evident that the descent is more rapid after the rupture of the membranes if the cervix is fully dilated.

The management of the pelvic floor phase is no longer a matter for too serious consideration. With the recent advent of caudal analgesia the first stage of labor has become rapid and astounding in its completeness. The perineal floor is completely relaxed so that it is unnecessary to consider a delay in either the first stage of labor or the descent phase of the second stage of labor as the mechanism is completely changed at this time. This rapid dilatation of the cervix and descent of the presenting part under caudal analgesia is one of the outstanding points which occur when this method of analgesia is used. I am now confident that the accessory muscle force which previously was considered necessary in the bearing down action of a patient during the descent phase is no longer necessary or justifiable as the presenting part under caudal analgesia relaxation is placed promptly at the vaginal outlet and is frequently spontaneously delivered without any exertion on the patient's part. When this stage is reached, the patient can be promptly delivered, and should be, by the simple application of outlet forceps.

I am glad that Dr. Calkins has stressed the importance of the accurate diagnosis of position and station of the presenting part by vaginal examination, as well as the amount of dilatation and effacement of the cervix which exists. Too many rectal examinations, it seems, are done solely for the purpose of estimating the descent of the presenting part as it is not always possible by rectal examination to make an accurate diagnosis of the completely dilated and effaced cervix. A careful and well-executed vaginal examination is harmless and too frequent rectal examinations may produce more infection than one good vaginal examination.

I cannot subscribe to the conservative methods of delivery after the presenting part has reached the pelvic floor. Either manual or forceps rotation or decomposition and extraction of the breech can be very easily accomplished if the relaxation of the perineum exists as in a properly acting caudal analgesia.

Caudal analgesia will have to be given eventually its proper place in the conduct of labor, as it has been definitely conceded that dilatation of the cervix is more rapid and the descent phase is shortened considerably in both the multiparous and the primiparous patient.

TABLE I. ETIOLOGY OF HIGH STATION
(AT ONSET OF SECOND STAGE)

Cervix and L.U.S.	33% factor
Unruptured membranes	15% factor
Large baby (over 3,500 Gm.)	5% factor
Occiput posterior } Deflexion }	Negligible
Abnormal presentation, hydrocephalus, etc., not studied.	

TABLE II. THE DESCENT PHASE

Voluntary effort	Most important
Character of pains	20-minute factor
Large baby	6-minute factor
Unruptured membranes	3-minute factor
Occiput posterior	Negligible, unless combined with other adverse factors
Late internal rotation	
Incomplete flexion	