

A SHORT UMBILICAL CORD AS A CAUSE OF DYSTOCIA.

WITH A DESCRIPTION OF A NEW SYMPTOM.

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AN unusually short umbilical cord has long been known to possess inheritant difficulties. Early in this century the classical Denman¹ and the observant Jorg² not only described the dystocia due to an abnormally short cord, but gave directions for the conduct of a labor under conditions in which this rarity presented itself, and their advice has not been improved upon since their day. Obstetricians draw a distinction between the cords which are inherently short and those which are shortened by being wound about the fetus. The former is known as a "natural" or "absolute" shortening, the latter as a "relative" or "accidental" shortening of the cord. This paper deals with the former or absolute variety.

The relative length of shortness of the umbilical cord cannot be fixed. A cord which would be of normal length, or would at least allow of easy, unassisted birth in one case, would, in another, be too short to permit a fetus to be born without help. The cord may vary in length from two inches to many feet. To be a factor in the delay of labor the cord must actually be so short, measured from the umbilicus to its placental insertion, that the fetus cannot be born without one of several accidents

being likely to happen. These may be: rupture of the cord at any point along its course, detachment of the placenta, inversion of the uterus, or, as has not previously been clearly pointed out, an umbilical hernia in the child. The first two accidents are the more common ones, the last two the rarest, in the presence of this condition.

The location of the placenta is vital in determining the absolute length or brevity of the cord. If the placenta lies low in the uterus a cord which would prove too short were it higher in the uterine cavity is sufficiently long to permit the birth of the fetus. A central or marginal insertion of the cord into the placenta must also be taken into account in estimating its actual length. This is, of course, not possible before birth.

In the consideration of the accidents which may ensue from an unusually short cord it is necessary to give some thought to the tensile strength of the cord and the influence of the expulsive forces upon its elasticity. Connective tissue acquires its tensile capacity from the amount of elastic fibres it contains. In the mucoid or colloid structure of the umbilical cord, elastic fibres are found increasing in number as the end of pregnancy advances. The younger the cord, the fewer and weaker are the elastic fibres—Hertwig.¹¹ Lesshaft,³ quoting the figures of Valentin and Rauber, states that the tensile strength of connective tissue containing elastic fibrils is greater than that of a wire made of lead and equal to that of a cord of tow. The elasticity of the umbilical cord has also been made the subject of study by Duncan⁴ and Lamare.⁵ The former observers found that the average cord breaks under a strain of eight and one-quarter pounds, while Lamare's figures are somewhat lower than this. He found that the cord ruptures under the influence of a falling weight at about five and one half pounds. It seems to me that the statements of Duncan and Turnbull are entitled to greater consideration, since their experiments were conducted on principles more nearly consistent with the actual conditions.

Assuming, then, that the average cord will break under a strain of between eight and nine pounds, and that the force of the uterine contractions during expulsive pains is forty pounds, as given by Herman,⁶ it is evident that the cord must be long enough during birth to allow the umbilicus to reach the vulva and slightly beyond it, or it will break, or will tear the cord from its umbilical insertion, or will tear the placenta from its insertion, producing hemorrhage, death of the fetus, or an inversion. Negrier⁷ gives the average length of the parturient canal at the time of the expulsion of the fetus as 8½ inches, and I am not acquainted with any figures which are more reliable. The limit of safety, then, in the length of the cord would be about ten inches—that is, a cord shorter than this would be almost certain to be productive of accident. Kaltenbach⁸ points out that the placental insertion of the

cord has much to do with the dangers of its shortness, as we have already seen. He believes, however, that if the placental insertion of the cord is at the fundus, 35 centimetres (13 inches) is too short for a safe delivery, while in the lower insertion, he thinks 20 centimetres (8 inches) long enough for easy birth. So far as I can learn, Kaltenbach stands alone in his belief that even under favorable conditions a cord of 8 inches is a safe one. On physical grounds we have seen that the cord should be at least 10 inches long to ensure an unassisted delivery.

Cords shorter than 10 inches are very rare. In two services which embraced upward of 1200 cases I never saw one. Dewees⁹ had never seen an absolutely short cord, and was inclined to doubt the existence of such an anomaly. Many ruptures of the cord, some cases of inversion of the uterus, some accidental hemorrhages from the placenta, so-called, and some of the umbilical hernias in children, as I shall show, can be traced to this phenomenon.

Before referring to the diagnosis and treatment of an absolutely short cord I shall record a case which came under my observation, in many respects a classical one:

Elderly primipara; position, L. O. A.; protracted first and second stages; short cord; separation of the placenta during labor; post-partum melancholia; umbilical hernia in child. Mrs. E. G. B., aged thirty-four years, married eight years, primigravida. Menstruation has always been regular but painful. There is no family or personal history of importance. There is no history of syphilis. The last menses appeared February 22, 1895. The predicted date of confinement was November 29, 1895: The pregnancy was uneventful. The urine was negative throughout. The feet and hands were somewhat swollen toward the end of the gestation, but there was no general oedema. The patient had read some popular work on marriage, and was very apprehensive as to the outcome of her labor. During her confinement she talked in an absurdly mistaken manner of child-bed fever, second-stage pains, child's stomach-rash, etc. The patient was a stout woman, but not inordinately so; she was phlegmatic, stupid, and exceedingly irritable. The pelvic measurements showed a pelvis somewhat larger than usual.

On December 3, 1895, she had a few false pains, with the discharge of some fluid, which, I had no opportunity of seeing. At 8 P.M., December 6th, labor began with infrequent and weak pains, and the patient remained in this condition until 1 P.M. of December 7th, when she complained greatly of fatigue, and begged to have the child taken from her. She was given a hypodermatic of one-quarter of a grain of morphine, after which she slept for two and one-half hours. At 5.40 P.M., labor pains again started in, weak and infrequent. The foetal heart was then beating at the rate of 140. At 10 P.M. the patient was given fifteen grains of the muriate of quinine. In half an hour the pains had become much stronger and more frequent. The cervix had almost disappeared, and at 11.30 P.M. the membranes were artificially ruptured, in the hope of hastening delivery. It was, however, 2 A.M., December 8th, before the patient was fully in the second stage. The pains were now frequent and expulsive, and again and again the head could be seen at the vulva, only

to be retracted as soon as the uterine contraction ceased. In the intervals between pains, as well as during a pain, bright arterial blood constantly escaped, but not in sufficient quantity to cause alarm or to weaken the patient. During the entire second stage the patient complained of pain over the left side of the uterus, at a point where I subsequently located the placenta. She urinated frequently during the beginning of the second stage, *between pains*, passing a small quantity of urine at a time. At 5.30 A.M. a male child, weighing six and three-quarter pounds, was born, the head being peeled out of the labia, and firmly held, despite the efforts of retraction, which ceased when the biparietals were in the vulva. The child was somewhat asphyxiated, having passed meconium for twenty minutes previous to its birth and being covered with it. It was easily resuscitated, the cord being tied at once. At no time did the necessity of applying forceps seem necessary to me.

The hand placed over the fundus immediately after the birth of the child could easily feel the placenta at its insertion on the left side of the uterus about midway between the fundus and the cervix. It was expelled with such ease twenty minutes later that I was convinced at the time that it had been lying loose in the uterus, an opinion which was confirmed by finding its maternal surface covered with a large and moderately thick clot. This condition also made clear the source of the hemorrhage of arterial character during labor. The cervix, I might add, had not been torn. The placenta was the seat of marked calcareous degeneration. The cord measured, in its entirety, ten and one-half inches.

Convalescence was interrupted by a mild melancholia, which disappeared in two weeks. The child was noticed the following morning to have a marked protrusion at the umbilicus, which, after the dropping off of the cord, presented a granulating surface. A month later it looked like a small collar-button. Under the application of the solid silver stick and a compressing bandage it disappeared in four months. This protrusion was at first thought to be a Meckel's diverticulum, but a careful subsequent examination proved it to be an umbilical hernia. I believe that it was the direct result of the tremendous tension exerted upon the cord and its attachments at both ends during labor.

The delay in both the first and second stages can be credited without harshness, I believe, to the extreme brevity of the cord. The fact that the patient was an elderly primipara, who was somewhat stout, may have been an element of delay in the first stage, but it would be going far afield to attribute all the symptoms—the pain over the placental site, the arterial bleeding during labor, the recession of the head between pains, the frequent urination between pains, the umbilical hernia of the child—to anything but the fact that the cord was abnormally short, so short, in fact, that the child could just be born without artificial assistance.

SYMPTOMS AND DIAGNOSIS. The symptomatology which characterizes the absolute or natural short cord does not differ much from that which is seen when the cord is shortened by being coiled about the child's body. The variations which may present themselves in a perfectly normal confinement may easily obscure the symptoms of a condition at

no time common. Probably the most characteristic phenomenon to be attributed to the short cord is the recession of the head with the dying out and disappearance with each successive pain. This is so marked, and so much greater than the recession which follows the usual cessation of uterine contraction during labor, that it attracts the attention of the accoucheur at once. The entire parturient canal diminishes in length with the advent of uterine pains, increasing again as the uterus relaxes, so that in an uncomplicated case the head naturally recedes after a certain advance. When, however, in addition to the natural recession there is added the elastic pull of an umbilical cord which will not permit the foetus to maintain the advance it has made, it is evident that not only will the head recede with the end of each pain, but that this recession will be so rapid and so constant that it will offer a striking feature in the delay of labor. In the case narrated this recession was a puzzling factor to me, for I confess that its cause was not clear to me before the child was born.

Those who have written on the subject give a prominent place in the symptomatology to pain over the placental site and depression of the placental area during a pain or during traction by the forceps, attributing the pain to peritoneal stretching. (Duncan.) The former of these elements was decidedly in the foreground in my case. The latter was not observed. It is natural to expect pain in this condition when the placenta is undergoing a pull or a tug with each succeeding contraction of the uterus, for, though the entire genital canal diminishes in length with each pain, the child advancing despite the shortness of the cord, the tendency is for the placenta to become freed from its attachment to the uterine wall. Actual detachment occurs when the cord is exceedingly short in all those instances in which the umbilical insertion does not give way. In my case the placenta undoubtedly suffered partial separation, a deduction easily made from the constant appearance of bright blood during the labor, and from the condition of the placenta after its delivery. The fact that the recession of the head ceased upon the birth of the biparietals in my case was also unquestionably to be attributed to the loosening of the placenta and the consequent absence of further resistance.

Bleeding during labor, which does not come from a placenta prævia, or a torn cervix, or a tear in the vagina, should always direct suspicion toward the placenta, and when there is a combination of symptoms such as are included in this description the cause may not unfruitfully be sought in a shortened cord. In the case presented the hemorrhage was of an arterial character throughout, and aroused curiosity as to its probable source. It was present as well in the absence of pains as when the uterus was contracting. At no time did it impair the volume of the pulse of the patient, who was rather a plethoric woman.

It might well be expected in a condition in which there is a constant opposing influence on the accession of each pain to the advance of the fœtus that an exhaustion of the pains would ensue as a consequence. In my case this did not occur during the second stage, in which the dystocia was most marked. The delay in the first stage I have been inclined to attribute in part to the fact that I had an elderly and rather stout primipara to deal with. Napier,¹⁰ however, regards uterine inertia as a cardinal symptom of a shortened cord or of one absolutely short. The expulsive pains of the second stage in the case here reported gave no indication of abnormality alone—they were strong and frequent. Another symptom which was lacking in my patient was one upon which much emphasis is laid by King,¹¹ who has reported a number of these cases. He assumes that it is indicative of the patient's natural desire to obtain the benefits of gravity in delivering herself of her child, a view in which he was anticipated by Denman.¹ It certainly seems most natural for a patient with this anomaly to assume the upright position, and, as a matter of fact, my patient was frequently in the semi erect position during the second stage, but made no mention of the fact that that posture gave her any relief.

A symptom which I wish to add to the symptom-complex of a natural short cord—which might be equally applicable to a cord wound about the child's body, and which I have been unable to find elsewhere recorded—is one that was quite striking in my case—the frequent urination during the first part of the second stage. A moment's consideration of the anatomy of the soft parts at this stage of labor will aid, I think, in giving a clear notion of the significance of this symptom.

The bladder lies entirely above the pubes when the second stage has become established. As this stage proceeds to its natural termination by the advance of the fœtal head the bladder becomes tightly pressed against the symphysis, lying parallel with it. The urethra, too, is compressed and becomes elongated. It is notorious how difficult catheterization becomes at this stage of labor, and how almost impossible it is for a woman to urinate spontaneously at this time. Urination, then, on the disappearance of each pain, when the cervix had entirely disappeared, was a striking phenomenon, and is to be accounted for only on the ground that as the expulsive effect of a uterine contraction wore off the short cord was sufficiently strong to draw back the body, and with it, of course, the head. This manœuvre allowed the bladder again to fall forward and to empty itself of its contents, being stimulated to the act by its frequent compression. As soon as the head had advanced to a point from which the retractive efforts of the short cord could no longer dislodge it the urination ceased.

It is a perfectly logical deduction, I think, that when we have the unusual symptom of urination during the intervals of pain in the second

stage, especially at its beginning, that the attention of the accoucheur should be directed toward the shortness of the cord as the probable cause of this unusual clinical feature. He should be especially suspicious of this condition if there are a simultaneous recession of the head in the intervals, arterial bleeding almost constantly, and one or more of the other symptoms already recorded.

Briefly to summarize the diagnostic points in the order or their importance, I would place them as follows :

1. Recession of the head in the intervals of pains.
2. Arterial bleeding during and between uterine contractions.
3. Urination in small quantities in the intervals of pain after the establishment of the second stage.
4. Pain over the placental site, especially during a uterine contraction or during the application of forceps.
5. A desire of the patient to sit up.
6. Uterine inertia.

TREATMENT.—It is unfortunate that a diagnosis of an absolutely short cord can rarely be made with certainty before the birth of the child as far as the umbilicus. If it were possible always to make sure of the condition treatment would be of little avail. When a short cord is suspected, and the life of the child is thought to be in danger from the objective signs of an accelerated heart or the passage of meconium, the labor should be terminated as soon as possible. By pressing the fœtus down the placental insertion of the cord is brought near its umbilical insertion, and the danger of rupture somewhat obviated. But this is not always feasible or possible. Postural methods may be tried by having the mother assume a squatting or kneeling position, as recommended by Denman¹ and praised by King.¹¹ If the child presents by the breech, the cord should be tied as soon as the umbilicus is born. The advice given in some text-books, regardless of the position, to tie the cord if it is found too short to allow the birth to take place, is little short of absurd. The impossibility of tying the cord of a child in the second stage of being born is so self-evident that it seems almost laughable to refer to it were it not that some authors recommend it in perfect good faith. The use of the forceps is practically contraindicated in these cases: it would be almost certain to end disastrously to the child.

109 WEST EIGHTY-SECOND STREET.

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