Case I

A boy, aged 14, was admitted to hospital on February 19, 1937, having been ill for the past week with headache, general irritability, and vomiting. There was definite head retraction and rigidity of neck, and Kernig's sign was present. He was normally conscious. The cerebrospinal fluid was under pressure and was turbid.

Pathological Report, February 22.—"Turbid xanthochromic fluid with a heavy deposit of pus. Chlorides 0.680 per cent.; sugar absent; albumin 0.3 per cent. Films show large numbers of polymorphonuclears and a very occasional Gram-negative diplococcus, probably meningococcus."

The patient was treated by anti-meningococcal serum—intramuscular on February 19, intramuscular and intravenous on February 20; and by prontosil, two tablets (0.6 gramme) every four hours—that is, 3.6 grammes (about 60 grains) each twenty-four hours—commencing February 21 and continued for one month.

He rapidly improved. Lumbar puncture on February 19, 20, 21, and 22, and again on March 17, showed that the fluid was clear, and the pathologist reported it to be normal. Before the end of the first week the headache and neck retraction had entirely disappeared. He looked well, and said that he felt well. He continued to have a slight pyrexia, which in the third and fourth weeks sometimes reached 100° F., but remained in good health and without symptoms.

Case II

A youth, aged 17, was admitted on April 26, 1937, with four days' history of headache and pain in the back and limbs, with vomiting for the last two days. He was quite conscious. Head retraction and neck rigidity were present. Kernig's sign was positive, and the cerebrospinal fluid was turbid and its pressure much increased.

Pathological Report, April 29.—"Turbid xanthochromic fluid, with a large coagulum and heavy deposit of pus. Chlorides 0.720 per cent.; sugar absent; albumin 0.2 per cent. Films show large numbers of polymorphonuclears and a very occasional Gram-negative diplococcus—probably meningococcus."

Treatment.—He was given 10 c.cm. of serum intramuscularly and 10 c.cm. intrathecally on April 26; 10 c.cm. intrathecally and 10 c.cm. intravenously on April 27; prontosil on April 26—two tablets (each 0.3 gramme) four-hourly, increased to twenty tablets in the twenty-four hours on April 29, reduced again to twelve in twenty-four hours on May 2, and stopped on May 10. The patient made a rapid recovery.

Case III

A youth, aged 17, was admitted on May 7, 1937. Four days earlier his illness had begun with headache, vomiting, and stiffness in the neck. He was conscious. His head was retracted and his neck rigid. Kernig's sign was positive. The cerebrospinal fluid was under increased pressure and was turbid.

Pathological Report, May 8.—"Fluid very turbid; xanthochromic, with a heavy deposit of pus. Chlorides 0.690 per cent.; sugar absent; albumin 0.2 per cent. Films show large numbers of polymorphonuclears, and a very occasional Gram-negative diplococcus, probably meningococcus."

Treatment.—This was by prontosil only—two tablets (each 0.3 gramme) every two hours (7.2 grammes in twenty-four hours), reduced on May 9 to every four hours, and stopped on May 17.

He very rapidly recovered, losing his headache, retraction, and rigidity. During a second rise of temperature, which occurred from May 14 to May 17, he said that he felt quite well. His cerebrospinal fluid was normal, and the blood culture negative. A blood count was not done.

Case IV

A youth, aged 16, was admitted on June 24, 1937, with five days' history of headache and shivering, followed by drowsi-

ness, neck stiffness, and vomiting. Head retraction and neck rigidity were present, and Kernig's sign was positive. Herpes labialis was also present. The patient was conscious. The cerebrospinal fluid was under pressure and turbid.

Pathological Report, June 26.—"Very turbid xanthochromic fluid with a heavy deposit of pus. Chlorides 0.700 per cent.; sugar absent; albumin 0.2 per cent. Films show large numbers of polymorphonuclears; no micro-organisms seen."

Treatment.—Prontosil only—two tablets every two hours, reduced on June 26 to every four hours and stopped on July 3.

The patient very rapidly recovered, and the pathological examination on July 5 showed a normal cerebrospinal fluid. On July 7 he developed a generalized papulo-erythematous rash. This lasted only a few days, and he was discharged in good health on July 14.

[NOTE.—The *Journal of the American Medical Association* of February 26, 1938 (p. 630), contains an article on "Sulfanilamide Therapy in Meningococcic Meningitis," in which Dr. Leon J. Willien reports an account of five cases, all cured by that substance. The author gives an initial subcutaneous injection of a large dose of the saturated (0.8 per cent.) solution in amounts approximating 0.05 gramme per kilogramme of body weight—that is, 500 c.cm. for a normal-sized adult—followed by 15 grains (1 gramme) by mouth every four hours.]

UNUSUAL COMPLICATIONS OF LABOUR

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The two cases here described are grouped together for reasons other than their comparative rarity. At a first glance each appears to be a rare complication of labour, and there the similarity might appear to end. In one an annular portion of cervix was detached spontaneously during labour, while in the other an acquired vaginal septum obstructed birth. Their points of similarity probably lie in both aetiology and effect—a pre-existing inflammatory condition was certainly the cause in one, if not in both, and in each case there was a degree of obstruction to labour in the soft parts of the birth canal.

Spontaneous Amputation of the Cervix during Labour

Spontaneous separation of part of the cervix in the course of labour would appear to be a rare accident. E. J. Decosta (1933) was only able to collect thirty-two cases from the literature between 1820 and 1933, and there was a long lapse of time between the reporting of the first two cases in America—that of Johnson was observed in 1851 and the second was recorded by Dorsett in 1927. Scott reported in 1821 the first case of annular separation of the cervix, which occurred in the case of a primipara, aged 36, after a long labour; the detached portion of cervix was expelled before the birth of the child. The next case was that of Carmichael, later reported by Power (1840). In this case there was definite evidence of disproportion, for after the cervix had separated spontaneously embryotomy was necessary to deliver the child. If this peculiar accident of childbirth is to be viewed in its right importance it must be accepted that a large proportion of the very few recorded cases are not proved examples of spontaneous separation. In fact, unnecessary obstetric interference was probably the para-

mount factor, and thus certain recorded cases do not properly belong to the spontaneous group. Some facts of interest are brought out in the following case history.

Case I

A primigravida, aged 26, was seen as an emergency case. Labour began on February 19, 1930, and the patient was admitted to hospital at 3.40 p.m., apparently suffering from a severe degree of pain in the back. The general condition was good, her temperature being 98° F., her pulse rate 88, and her blood pressure 130/80 mm. Hg. The uterus was larger than normal; the foetus was in the first vertex position, the head was engaging, and the foetal heart was heard. The pelvic measurements were normal, the cervix was one-finger dilated, and the membranes were intact. Combined abdominal and vaginal examination failed to show any disproportion. The membranes ruptured at 6 p.m., and examination revealed the cervix to be two-fingers dilated.

On the following day (February 20) at 4 p.m. a further vaginal examination was made. The head had advanced and the absence of disproportion was confirmed. The cervix was three-fingers dilated and definitely not oedematous. On February 21, at 11 a.m., the head was found to have advanced little and a band of tissue was felt lying below and behind the foetal head. This was identified as an annular portion of cervix which was detached almost completely.

Subsequently, at 5 p.m. on the same day, the patient was delivered with forceps of a living male child. There was little difficulty in delivering the head, but considerable difficulty with the shoulders, which were unduly broad. There was considerable post-partum haemorrhage, due to the uterus being atonic and to torn vessels in the cervix. The annular portion of cervix was attached loosely to the uterus posteriorly over an area of between a quarter of an inch and half an inch. Slight traction completely detached the torn fragment. The cervix was sutured posteriorly and haemorrhage arrested to some extent. Laterally and anteriorly it was impossible to suture the cervix, so the vagina and the remains of the cervix were plugged. At the time of delivery a swab was taken from the region of the cervix and subsequently showed a profuse growth of *Streptococcus pyogenes*; 30 c.cm. of scarlet fever antitoxin were given immediately after delivery.

The patient was very shocked after delivery, her pulse rate rising to 150, but after twenty-four hours it had fallen to 120 and the temperature was 99.6° F. From the second day onwards the puerperium was uneventful. The baby's weight at birth was 8 lb. 9 oz.; the total duration of labour was sixty-two hours.

SEPARATED PORTION OF CERVIX

It can be definitely stated that a cervix which was not oedematous at any time during labour and which felt normal became separated for about seven-eighths of its circumference in nineteen hours. The separated portion of cervix showed the external os to be dilated to a size of 2 inches by 1½ inches; more cervical tissue was detached anteriorly and posteriorly than laterally. The detached portion was progressively thinner from the external os to the line of separation, and there were scattered areas of haemorrhage into the substance of the cervix. Both surfaces were covered with irregular flakes of lymph and fragments of necrotic tissue.

Microscopically, the epithelial covering of the cervix had for the most part disappeared. The blood vessels were dilated and engorged with blood, and blood was also extravasated into the substance of the cervix, which consisted mainly of fibrous tissue; very little muscle and no elastic tissue was seen.

SUBSEQUENT HISTORY

On vaginal examination of the patient three weeks after delivery the cervix had contracted down and felt normal; in fact it was difficult to believe that a portion had been detached. In August, 1934, the patient was seen again. Since the labour in 1930 she had had no pregnancy; her periods were regular, the loss remained unchanged, and there was no pain. She had suffered intermittently from a slight vaginal

discharge, but otherwise her health had been excellent. The child was progressing well and apparently had not suffered in any way.

Comment

It would appear to be of prognostic importance that, in this case as in all recorded cases, the cervix tears at a point well below the utero-vaginal junction, otherwise fatal complications would probably occur. In the case under discussion the separation of part of the cervix was discovered too late for any treatment. If a circular tear was diagnosed early it seems possible that a radial incision in the cervix opposite the tear might well prevent it extending further. Certain aetiological factors have been described in this rare condition and some can be accepted as possible in this case. Disproportion is an obvious predisposing cause, first giving rise to oedema and later to necrosis and separation. In this instance, however, there was no disproportion and the cervix was not oedematous up to nineteen hours before delivery; in fact, oedema was never noted. L. Phillips (1927) recorded a case of spontaneous separation in which there was no disproportion. The patient was a primipara, aged 44; labour was induced at the thirty-seventh week and the membranes ruptured with the onset of labour. Twenty-nine hours after the onset of labour the cervix would only admit two fingers; seven hours later no ring of cervix could be felt, but behind the head an oedematous lip of cervix was palpated. Subsequently, when it was decided to deliver the patient with forceps, a ring of detached cervix slid out of the vagina. The patient died from a *B. coli* septicaemia. In this case the age of the patient and the early rupture of the membranes would appear to be the only definite factors.

Early rupture of the membranes must of course place an undue strain upon the cervix, and in a high proportion of Decosta's (1933) series the membranes ruptured early or before labour started. In the case here recorded there was certainly a long labour, and the membranes ruptured after fifteen hours when the os was two-fingers dilated. Normally, during the first stage of labour cervical dilatation depends largely upon the upward traction of the longitudinal muscle fibres of the uterus and the downward pressure of the bag of waters. With removal of this hydrostatic bag there must be more pressure exerted through the foetus, and subsequent advancement and dilatation are due to the direct pressure of the foetal head. In any event, there must be undue pressure on the cervix and particularly in a case of disproportion. In disproportion the maximum pressure is naturally localized on that part of the cervix which is nipped between the foetal head and the pelvis. The absence of disproportion allows the foetal head to press evenly on the dilating cervix, and thus one should not expect to find oedema present. This hypothesis undoubtedly explains the absence of oedema in the present case. Some degree of dilatation of the external os, together with effacement of the internal os, was also present and can be regarded as typical of this accident. The fact that dilatation is able to proceed to a certain degree rather tends to negative the possibility of any inherent rigidity being a factor.

Certain abnormalities of the form and fabric of the cervix may well be predisposing factors. The only abnormality in form to be considered is the length. Unfortunately, no observer seems to have noticed this point before labour or to have had an opportunity of studying it in these cases. The matter remains one of conjecture, the only evidence being the portion of tissue left behind. Three weeks after delivery my patient had a cervix of apparently normal proportions, and yet the detached

annular ring represents a considerable amount of tissue. It may therefore be suggested that in this case the cervix was most probably abnormally long. In a case described by Fùth (1923) the findings were similar.

Could the cause of separation lie in the texture of the cervical tissue? This question is pertinent, but, unfortunately, the tissue separated is not ideal for exact microscopical examination. The normal cervix contains proportionately more connective tissue intermixed with smooth muscle and elastic fibres than does the body of the uterus. Other factors being equal, the ability of the cervix to dilate varies directly with the amount of muscle and elastic tissue as compared with fibrous tissue present. Couve-laïre considered that the leucocytic infiltration frequently noted was indicative of pre-existing inflammation, which in turn gave place to fibrosis and rigidity. In the case described sections of the detached cervix appear to consist mainly of fibrous tissue infiltrated with blood; muscle fibres are scattered irregularly and in very small proportion, and elastic tissue is completely absent.

It is thus clear that in Case I the cause of rupture can be assigned to certain factors: (1) rupture of the membranes when the os was only partially dilated, thus bringing undue pressure upon the cervix; (2) an abnormally long cervix; and (3) a change in the fabric of the cervix, causing an increased proportion of fibrous tissue.

The incidence of cervicitis is so high and the accident of cervical detachment so rare that if previous inflammation be accepted as a definite aetiological factor there must be other contributory factors with which we are not yet sufficiently familiar.

This case also illustrates an interesting point in puerperal infection which has been recorded previously. A swab taken from the region of the cervix at the time of delivery produced on culture a pure growth of *Streptococcus pyogenes*, which was proved to be virulent as regards experimental animals. The patient received 30 c.cm. of scarlet fever antitoxic serum and her temperature remained normal after the first day of the puerperium. Thus, she escaped puerperal sepsis in spite of the presence of a virulent strain of streptococci in the birth canal and severe damage to the soft parts. This must be attributed either to her own personal immunity or to the early use of serum. Whichever be accepted as the cause, the lessons to be learnt are identical in principle. The origin of *Streptococcus pyogenes* in the birth canal in this case is a matter of conjecture. This organism is not commonly present in the birth canal before labour. In 600 cases investigated I only found it present in three cases, and all possessed such a degree of immunity that no puerperal infection resulted.

Acquired Vaginal Septum Obstructing Labour

In the second case a vaginal septum sufficiently thick to obstruct delivery was acquired in a maximum period of two years. At the time of delivery the septum was imperforate, and after delivery by Caesarean section the pressure of the contracting uterus, stimulated by pituitrin, was insufficient to expel any lochia. That about forty weeks previously there must have been some orifice through which spermatozoa could penetrate is obvious. The method of dealing with this case may at first seem unusual, but the complications were also unusual and the end justified the means.

Case II

A patient, aged 26, had a history of two previous pregnancies with normal labours at term. No positive history

of vaginal laceration could be elicited, and there were no symptoms of such laceration having occurred, but no search had ever been made. The patient was seen in consultation with her own doctor on February 29, 1932. She had been in labour for eight hours with strong pains; on vaginal examination her own doctor had been unable to identify the cervix. The foetus was lying in the first vertex position and the head was well down in the pelvis. On vaginal examination the foetal head was easily felt through a septum, but the external os could not be identified, and even with a speculum no trace of the cervix could be found. A sound passed into the bladder reached almost to the blind apex of the vagina, and a finger was inserted into the rectum to a point only three-quarters of an inch from the end of the sound. Owing to the close proximity of the rectum and bladder, however, it was thought dangerous to incise the vaginal septum lying below the foetal head.

A classical Caesarean section was performed and a live baby delivered. After removal of the placenta, the lower uterine segment was carefully examined, visually and by palpation, but no part of the os could be identified. After suturing the uterus and abdominal wound, the patient was placed in the lithotomy position. No blood had passed into the vagina, and other search for the cervix was fruitless. Pituitrin, 5 units, was given four-hourly; each injection produced pain referred to the uterus, but still no lochia escaped. As the pituitrin produced an unpleasant degree of pain and as there was also abdominal distension not relieved by enemata, eserine sulphate, grain 1/32, and strychnine sulphate, grain 1/32, were substituted. These also produced abdominal pain and were therefore discontinued. The height of the uterus remained unchanged until the eleventh day of the puerperium; during the twelfth and thirteenth days the level rose by one inch, and continued to rise till the fifteenth day. Following this the height gradually fell, till it reached a level half-way between the symphysis pubis and the umbilicus on the twenty-second day of the puerperium. During the whole puerperium there had not been any escape of lochia and the temperature and pulse remained normal.

EXCISION OF VAGINAL SEPTUM

On the thirtieth day after delivery the patient was examined under an anaesthetic in the lithotomy position. The vaginal vault was seen to be blue in colour and bulging. The centre was incised and about 10 oz. of chocolate-coloured inspissated blood escaped; the uterus was then carefully washed out at a low pressure. The incised membrane was found to be very tough and about a quarter of an inch thick; a circular area of one and a quarter inches diameter was removed. Adherent to the upper surface of this membrane the external os was located and found to be two-fingers dilated; the internal os still seemed to be fully taken up. Recovery from this operation was uneventful and the lochia ceased twelve days later. The patient was again examined after an interval of eight weeks. The uterus was then found to be fully involuted, and the orifice in the vaginal septum had contracted down so as to admit only one finger. Under an anaesthetic more of the septum was removed and a vaginal dilator was left in position for a week, being removed and replaced daily. Microscopical examination showed the septum to consist of dense fibrous tissue covered on its upper and lower surfaces with stratified squamous epithelium.

Comment

This case certainly resembles those in which an inflammatory condition of the cervix or vagina has caused shedding of the covering mucosa, subsequent adhesion of the raw surfaces, and finally organization of the intervening inflammatory tissue. The end-result is an imperforate cervix or vagina. This condition is probably what was once known as the *conglutinatio orificii externi* of Naegele. Very few of these cases have been recorded. Croft and Claye (1928) described that of a woman who had passed through four normal pregnancies; there had been a

marked degree of prolapse and ulceration of the cervix. At the time of the fifth labour the only trace of the external os was a slight linear scar. A case more closely resembling the one described here was recorded by Kanter and Klawans (1930). They reported a case of vaginal atresia occurring rapidly after an operative delivery. In such cases the pelvic floor and bladder are greatly relaxed, so that the anterior and posterior vaginal walls come to lie in close approximation. In their case a woman was delivered on June 15, 1929. The delivery was with forceps and without any anaesthetic; no attempt to repair any tears was made. The temperature and pulse were normal in the puerperium, but no lochia were passed after the third day. The patient was seen on September 30 of the same year. There was then found to be atresia of the vagina at the level of the entrance of the urethra into the bladder. In this case the degree of damage to the vagina was not known and strong antiseptics employed at the time of delivery may have played a part in giving rise to the condition. This case demonstrates well how quickly atresia of the vagina may occur and the strength of the septum so formed—sufficient in this instance to retain the lochia after the third day of the puerperium.

In Case II the exact aetiological factors concerned in producing the septum must remain to some extent obscure, even though the field of possible causes is considerably restricted. The history of previous labours, in itself, at first seems to exclude any congenital abnormality as a possible contributory factor, but this must be considered later. Some trauma to the vagina in the course of the previous labour might have been the starting-point of such a septum. If there were trauma, then one would expect it to have been fairly severe and to have produced symptoms not easily overlooked. Yet the previous labours and puerperia were normal and the only symptom was a slight and persistent vaginal discharge. If the septum began to develop soon after the second labour, then one would have expected some obstruction to the flow of blood at the periods. Unfortunately, the flow was always small, and no change was noticed except a slight increase in pain during the periods. This pain may point to some obstruction arising in the vagina.

It is thus apparent that although trauma and infection either jointly or separately were the responsible factors, yet there is no real proof of this. One is forced, therefore, to consider afresh a congenital theory. Perhaps there was a congenital narrowing or a partial septum present in the upper part of the vagina, and a degree of trauma and infection unlikely to cause trouble in a normal vagina were the final factors in this case. This view is supported by the type of septum found, which was well defined, remarkably thick and resistant, and did not seem to consist of recently organized granulation tissue. Further, the vagina below the septum appeared quite normal and there was no evidence of long-standing infection anywhere in the genital tract. The total disappearance of an orifice during pregnancy also offers a remarkable picture; it is of interest to consider how small or large it was at the time of conception. The increased vascularity of the vagina during pregnancy would no doubt accelerate the closing of the septum, provided the edges were not epithelialized. This case also illustrates the fact that the retention of the lochia after labour need not cause any anxiety. At the time of the Caesarean section the degree of sepsis was good, and in the absence of any infection the retention of a large volume of lochia for a considerable period had no effect on the temperature, the pulse rate, or the general condition of the patient.

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UNUSUAL PHYSICAL SIGNS IN LOBAR PNEUMONIA

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Lobar pneumonia may present, in place of the classical physical signs, abnormal findings to confuse the diagnosis even when the onset, symptoms, and temperature all seem conclusive. These perplexing features would seem to require explanation, and this can be found only in the physiological and pathological changes in the underlying lung, since physical signs in themselves, even when taken in groups, are not conclusive proof of any particular disease. Thus the consolidation of pneumonia, due to alveolar exudate, is usually evidenced by dullness to percussion and by bronchial breathing, and these are the accepted signs of the disease. When alveolar exudation is complicated by bronchial filling there is produced a different group of physical signs—those of a solid lobe with a blocked bronchus. A complete absence of breath sounds is discovered, together with other signs suggestive of a moderate accumulation of fluid.

Three Illustrative Cases

A patient recently observed by us after tonsillectomy developed on the second day a temperature of 102°, dullness with absent breath sounds at the right base, and dullness with bronchial breathing at the left base, the apex beat not being displaced. Two days later an x-ray film showed consolidation at both bases, more marked on the right, but with no clear evidence of fluid. After ten days the fever subsided by lysis, but it was not until the fourteenth day that bronchial breathing was first detected at the right base. Subsequent x-rays demonstrated gradual clearing of the consolidation. We believe that the physical signs first found at the right base were those of pneumonic consolidation together with blocking of the main bronchus by a sputum plug, expectoration of which a fortnight later allowed air entry and the production of bronchial breathing. This supposition was confirmed by bronchography on the tenth day, when it was demonstrated that though the main bronchus of the right lower lobe was patent all the secondary and tertiary branches were blocked. Repetition of the bronchography prior to the patient's discharge showed the presence still of a little sputum, but for practical purposes the bronchi of the lower lobe were normal.

Another pneumonic patient exhibited the typical x-ray appearances of right basal consolidation, but though the percussion note was dull no breath sounds could be heard over