

.61854

ACCIDENTAL HAEMORRHAGE

( A Clinical Study )

With an Analysis of Eighty-four Cases.

by

THOMAS J. T. McHATTIE, M.B., Ch.B.



placenta, and it was not until Paul Portal<sup>1</sup>, in 1665, discovered the fact that in some cases the placenta was attached to the lower portion of the uterus, that the error of this old doctrine was discovered. Various authors were able to confirm the correctness of the views expressed by Portal; but it was reserved for an Englishman, Edward Rigby of Norwich, in 1776, clearly to distinguish between the two varieties of antepartum haemorrhage, and to give them the names they still bear of accidental and unavoidable haemorrhage.<sup>2</sup>

While a considerable amount has been written in recent years on both these varieties of haemorrhage, the latter has claimed a far greater share of attention than the former. Placenta praevia has formed the theme of many masterly monographs, accidental haemorrhage of comparatively few. The accounts of Placenta praevia in the text-books are long and full; accidental haemorrhage is by most authors accorded but a page or two. Yet the one is of no less importance than the other. Both are rare; both present difficulties in treatment; and both lay claim to a large proportion of the deaths occurring in childbed.

The name Accidental Haemorrhage has been objected to by certain authors on the ground that it is apt to be misleading and suggestive of a necessarily traumatic origin. If, however, it be clearly understood that the word is used, as Rigby originally intended it should be used, in a purely etymological sense, and not as indicating a traumatism, the chief objection to it is removed. Neither the name Ablatio Placentae, as suggested by Holmes,<sup>3</sup> nor Fundal

1. La Pratique des Accouch: Paris, 1665, p. 40
2. An Essay on the Uterine Haem: 1776
3. Amer: Jour: Obst: 1901, xliv. p. 753.

Incidental Haemorrhage, the name applied to the condition by Andrews,<sup>1</sup> nor yet the lengthy title used by Continental writers, offer sufficient advantages to induce English authors to depart from a custom with which they have long become familiar.

It has been my good fortune within the last few months to meet with four fairly typical examples of this form of haemorrhage, one of which belonged to the variety in which the haemorrhage is completely concealed within the uterus, and of which the number of recorded cases is still comparatively small. An analysis of these cases, together with eighty others, accounts of which I have collected from the literature, forms the basis from which the deductions in the following paper have for the most part been drawn. For the statistics of hospital cases, however, I am indebted to the Clinical Reports of the Rotunda Hospital, published in the Dublin Journal of Medical Science, to those of Queen Charlotte's Hospital and the City of London Lying-in Hospital, and to the unpublished records of the Royal Maternity Charity of London, access to the three latter of which has been facilitated through the kindness of the respective secretaries.

The first attempt to differentiate anatomically accidental from unavoidable haemorrhage was that of Barnes<sup>2</sup>, who, in 1847, promulgated his theory of Placenta Praevia, and, "by clinical observation and physiological deduction," demonstrated the existence of what he termed the "lower polar circle", the "boundary line between "haemorrhage and safety". This line he afterwards showed was identical with what became known as the retractive ring of Bandle, which, when uterine contractions are in progress, divides the upper from

1. Amer: Jour: Obst: 1904, lii. p.551

2. ~~Lancet, 1847, p.2~~ *Obstetric Med. and Surgery: 1885. Vol. II. p. 246*

the lower segment of the uterus. In this lies the exact anatomical distinction between accidental and unavoidable haemorrhage, that, whereas the placenta situated above the retraction ring becomes prematurely separated only under certain rare conditions, that situated below the ring is detached as an inevitable result of labour. The haemorrhage resulting in the former case is accidental, in the latter unavoidable. It is not always possible however to recognise clinically this anatomical distinction. There are certain cases of placenta praevia in which the placenta encroaches but slightly beyond the retraction ring, which occupy what may be called the border land between accidental and unavoidable haemorrhage. Clinically, they belong more strictly to the former than to the latter variety, for, as Whitridge Williams<sup>1</sup> has pointed out, they do not always produce haemorrhage. That they often pass unrecognised is probable from the somewhat astonishing statement made by Hirst<sup>2</sup>, based on an examination of the membranes and placenta after birth, that in one quarter of all cases of placenta praevia there is no haemorrhage; and I have myself seen a case in which, after a perfectly normal labour, without the slightest bleeding, the placenta and membranes showed unmistakable signs of there having been a low implantation of the placenta. The only possible way in which placenta praevia can be distinguished clinically from accidental haemorrhage during labour is by means of the examining finger. If placental tissue can be felt within reach of the os the diagnosis is evident; if, with the cervix sufficiently patent to admit of exploration with the finger, placental tissue cannot be felt, there is no course open to us but to regard the case as

1. Obstetrics, 1908. p. 810.

2. Text Book of Obst: p 526.

one of accidental haemorrhage, and to treat it accordingly.

#### VARIETIES.

Of accidental haemorrhage there are three varieties; (1) the external, in which there exists no impediment to the outflow of blood from the uterus, (2) the mixed, in which part of the effused blood appears externally, part is concealed within the uterus, and (3) the concealed, in which the blood is entirely contained within the cavity of the uterus, none whatever appearing externally. In my series of 84 cases, 34 belong to the external variety, in 38 there was both external and concealed haemorrhage, and in 12 the haemorrhage was totally concealed.

#### FREQUENCY.

The frequency of accidental haemorrhage is very difficult to estimate even approximately, so variously has it been given by different authors. This much, however, is certain, that among the earlier writers, at any rate, its frequency was very much underestimated. It is only by taking an aggregate of a large number of figures that one is able to arrive at any conclusion on the subject; for, while in some hospitals or clinics the number of cases is comparatively large, in others the reverse is the case. So too in private practice, many men of large experience have met with but few, if any, cases, while others, whose experience is more limited, have had several opportunities of observing it. As a striking instance of the great diversity of statistics one might cite the figures of Brodhead<sup>1</sup> on the one hand and of Jewett<sup>2</sup> on the other. The former estimates the frequency of the condition

1. Med: Rec: 1897, Vol: 1, p. 292.
2. Pract: of Obst: p. 505.

as 1 in 100, the latter as 1 in 8000 to 10,000 labours.

Among 8,621 labours treated at St: Mary's Hospital, Manchester, Ross<sup>1</sup> met with 34 cases. At Queen Charlotte's Lying-in Hospital<sup>2</sup> during the three years 1905 to 1907, 4,984 cases of labour were attended, of which 78 were instances of accidental haemorrhage. On the other hand, of 43,381 labours in St: Thomas's Hospital<sup>3</sup> during the last twenty years, I have only been able to find mention of 23 cases of this complication. Taking these figures along with those of the Rotunda Hospital,<sup>4</sup> and of Guys Lying-in Charity,<sup>5</sup> in which there were respectively 113 cases in 15,109 labours, and 105 cases in 49,109 labours, we get an aggregate of 112,542 labours, with 319 cases of accidental haemorrhage. This gives us a proportion of 1 case in every 352.7 labours. Now Holmes<sup>6</sup> estimates the frequency of the condition "as 1 in 200 as of pathological interest, "and 1 in 500 for clinic importance". My own figures, taken from cases of all grades of severity, would, therefore, tally with those of Holmes, being an almost exact mean of his two estimates.

Of the frequency of accidental haemorrhage in private practice it is less easy to form even an approximate idea. From the statistics that are obtainable it is evident that the condition occurs far less often than in hospitals. Swayne<sup>7</sup> estimates it in his own practice as 1 in 513, basing his figures on 1539 deliveries. *Bisher*<sup>8</sup> in a synopsis of 300 cases of midwifery, gives 1 of accidental haemorrhage, while an anonymous writer in the 'Lancet'<sup>9</sup> met with no

1. Scott. Med: & Surg: Jour: 1903, xii. p.409.
2. Clinical Reports.
3. St: Thomas's Hospital Reports.
4. Jellet. Manual of Midwifery, p. 623.
5. Galabin. Manual of Midwifery, p. 469.
6. Amer: Jour: of Obst: 1901, xliv, p. 759.
7. Bristol Med: & Ch: Jour: Vol: vii, p. 181.
8. New York Med: Jour: 1902, lxxxiv, 1268.
9. Lancet, 1903, ii, p. 1669.

case out of 5000 deliveries, which he attended in the East End of London.

There is no doubt that many of the slighter cases of placental separation pass unrecognised, and that those cases in which the so called "show" has been slightly in excess, are frequently of this nature. Spiegelberg<sup>1</sup>, Peterson<sup>2</sup>, Colclough<sup>3</sup> and others have drawn attention to old retroplacental clots, or masses of fibrin, that are frequently to be found, post partum, pointing to the occurrence of slight detachments, which had produced no symptoms. Brodhead<sup>4</sup> found mention of such small retroplacental clots of antepartum origin in 7 out of 1000 histories, which he examined, and it is probable that, were a routine examination of the placenta and membranes made in every case, more instances of the sort would be found. In hospitals, when notes of all cases are made, many mild instances are observed, which require no treatment, and this may account, in part, for the apparently greater frequency of accidental haemorrhage in hospital than in private practice. Thus of Ross's 34 cases, 14 are characterised as being moderately severe, and 6 as mild; and, of the 78 cases at Queen Charlotte's Hospital, only 28 are mentioned as "severe", while in several it is stated that no special treatment was required.

Cases of absolute concealment of haemorrhage are very rare indeed, though Holmes<sup>5</sup> is of opinion that more would be recorded if recognised, and, further, that many cases of sudden death in pregnancy and labour may, in all probability, be attributed to this complication. Among 4948 labours at Queen Charlotte's Hospital,

1. Text Book of Mid: Syd: Soc: Trans: Vol.ii, p. 550.
2. Pract: of Obst: p. 437.
3. Jour: Obst: & Gynoc: of the Brit: Emp: 1902, ii.p.154.
4. Med: Rec: 1898, ii. 294.
5. Op: Lit:, p. 759.

already referred to, 4 cases of concealed hæmorrhage occurred. In the 49,105 labours in Guy's Lying-in Charity the condition occurred once, once in the 43,381 cases at St: Thomas's Hospital, and once among 7,316 labours treated at the City of London Lying-in Hospital. We have thus an aggregate of 104,750 labours, with only 7 cases of concealed hæmorrhage, a proportion of 1 case in every 14,964.28 labours.

### ETIOLOGY

Between accidental hæmorrhage in the later months of pregnancy and abortion in the early months a striking analogy exists, which becomes more evident if the generally accepted causes of the two conditions be placed side by side. Accidental hæmorrhage is, indeed, a late abortion, magnified, it is true, in significance and gravity by the conditions attending it, but, nevertheless, in no essential point differing from the hæmorrhage which results in the throwing off of the ovum in the earlier months. In many cases the factors which lead to abortion are exactly similar to those which produce separation of the mature placenta. Take, for instance, such conditions as endometritis, albuminuria and traumatism. On the other hand, there are causes which would probably be more commonly active in the later months if they were not so frequently productive of abortion. This is pre-eminently the case with syphilis, and with mal-positions of the uterus. Just in the same way there are conditions which, if they did not almost invariably lead to sterility, would be operative in producing abortion, as an instance of which we may take malignant disease of the endometrium.

This fact has been borne in upon my mind more particularly in

1. Annual Reports.

considering a case that recently came under my notice. The patient had had repeated attacks of hæmorrhage, beginning at the third month, owing to decidual endometritis. In each of these attacks abortion was threatened, but it was not till she reached her seventh month, and after a somewhat severe hæmorrhage, that labour pains began, and ended in the expulsion of an immature but living child. Such cases are common enough, but are interesting, as forming a sort of connecting link between early and late hæmorrhage, which we are, I think, too much inclined to regard as separate and distinct conditions.

In considering the causes of abortion, Jellet<sup>4</sup> has drawn attention to the truth of Hegar's dictum, that 'the causes of premature expulsion of the foetus are generally to be dated back further than 'is usually done' -that, in other words, the immediate causes are usually secondary to some pre-existing cause, which may not, at first sight, be apparent. This is no less true as regards many of the causes of accidental hæmorrhage, notably endometritis, placental changes, and excessive contractions of the uterus, which are all almost invariably traceable to some primary source. The traumatic causes of accidental hæmorrhage, again, like those of abortion, are more evident and less occult than the pathological causes, and hence are often exaggerated in importance, more especially by the earlier writers. The growth of pathology, and the closer investigations of modern days have tended to dwarf into comparative insignificance factors once regarded as important, and to bring to the front pathological changes, such as only modern methods are capable of unfolding.

The causes of accidental hæmorrhage may be divided into the

1. Op: Lit: p. 623.

physiological, the pathological, and the traumatic; the two former of which fall into the group of predisposing, the latter into that of the exciting causes. Whatever form of classification we adopt it must be evident that the causes, separated for purposes of description, are in reality inseparable; for scarcely ever is a single cause operative. The most important are the pathological, which are probably, in some form or another, almost invariably present, many authors declaring that it is impossible for traumatism to produce their effect apart from some pre-existing pathological lesion between the placenta and the wall of the uterus.

#### PHYSIOLOGICAL CAUSES.

Various physiological changes occurring in the maternal organism during pregnancy may be considered in the relation of factors predisposing to the detachment of the placenta, although none of them probably, is capable of producing that result unassisted by some further determining cause. Barnes<sup>1</sup> showed that, as gestation advances, the relation of the placenta to the uterus becomes altered, its adhesion becomes less intimate, and slighter causes determine its premature detachment. Charles Robin<sup>2</sup> held that the utero-placental relations were closest at the fourth month, gradually becoming less and less so until after the birth of the child, when detachment of the placenta is readily accomplished. Recent researches, especially those of Eden<sup>3</sup> and Whitridge Williams<sup>4</sup> may be said to furnish a physiological basis for these statements, founded on clinical observation alone; for they have shown that there exist changes, more or less marked, in every ripe placenta, that these changes,

1. Obst: Operations, 4th Ed: p. 422.
2. Quoted by Gaston. Ann: de Gynec: 1906. Vol: iii, p. 669.
3. Jour: Path: & Bacteriol: 1897. v. 265.
4. Am: Jour: of Obst: 1900. xli. p.775.

which consist in the formation of infarcts in the substance of the placenta, are to be regarded, not as evidences of disease, but as normal, senile processes, and that they are progressive during the later months, reaching their normal limits at the term of gestation. These changes if at all marked, and when taken in conjunction with the progressive fibrinous degeneration described by Webster<sup>1</sup> as occurring in the decidua, and especially in the serotina, would certainly tend to loosen the placental attachments in the later months, and render that organ more liable to detachment. Such facts now proved by histological examination, were not altogether unknown to the earlier writers, although the changes on which they based their observations were little understood. Sir James Simpson<sup>2</sup> described a steatoid, cartilaginous, or calcareous degeneration, as occurring in many placentae at term, and regarded them more as a sign of early senility than as a mark of disease. Druitt<sup>3</sup>, and later Goodell,<sup>4</sup> held the same view, the latter regarding the so-called fatty degeneration of the placenta as merely an anticipation of the natural termination of the life of the organ.

The effect produced on the utero-placental relations by these changes is probably but slight, provided they keep within strictly physiological limits. What these limits are, however, it is not easy to define; but it is certain that they may be easily overstepped. It is probable that if this happen, if the physiological process become converted into a pathological, a train of events may be established, which may lead either to premature labour, or, what is more likely, to premature separation of portions of the placenta and hæmorrhage.

1. Human Placentation, p.51.
2. Select: Obst: Works, Vol: i, p.139.
3. Med: Clin: Trans: Vol: xxxvi, p.99.
4. Am: Jour: of Obst: Vol: ii, p.533.

It was held by Sir James Simpson that degenerative processes in the decidua, by producing separation of the membranes, were the cause of the onset of labour pains. Nor have recent researches been able to disprove this theory. These degeneration processes, as we have seen, take place in the serotina as well as in the vira - in the neighbourhood that is to say of the placental sinuses. If separation occur in this region haemorrhage must inevitably follow. The haemorrhage may at first be slight, thrombosis may occur, and the process may go no further. But, on the other hand, a small retroplacental clot may, by acting as a foreign body, set up powerful contractions, further separation may take place, and a dangerous haemorrhage be in this way produced. It seems to me highly probable that many of the slighter forms of retroplacental haemorrhage, which, as we have seen, are common enough, may be caused in this manner, that, in other words, they may be due to a slight exaggeration of the normal process, combined perhaps with some trivial external cause, which may be so slight as to pass unnoticed. This idea of the premature separation of the over-ripe placenta is an old one, and was aptly put by Dr Brunton,<sup>2</sup> when he likened the placenta so affected to an untimely fig shaken off by a sudden blast.

It has been thought by various authors, among whom are Barnes,<sup>3</sup> Spiegelberg,<sup>4</sup> and Goodell,<sup>5</sup> that excessive and irregular contractions of the uterus are in themselves capable of producing placental detachment and haemorrhage. The possibility of this, however, has been denied unless there be pre-existing pathological changes rendering the vessels of the serotina unusually brittle and readily

1. Op: Pit: Vol. i, p.94.
2. Obst: Jour: Gt: Brit: & Ireland, 1875, Vol iii, p.437.
3. Obst: Operat: p.223.
4. Text Book of Mid: Syd: Soc: Vol: i, p.529.
5. Amer: Jour: Obst: Vol: ii, p.328.

torn. Given such pathological basis, it is possible that any of the physiological causes of uterine contractions, apart even from trau-matism, may be the determining factors producing a haemorrhage otherwise unexplainable. From time immemorial theories as to the conditions which lead to the onset of uterine contractions have been advanced, but the most recent is that suggested by the experiments of Drs. Dixon and Taylor<sup>1</sup>, which show that a juice is secreted by the ripe placenta, which, if injected into the veins of animals, produces among other effects a marked increase in the rhythmic contractions of the pregnant uterus, and may possibly lead to the onset of labour.

The changes, which, as we have seen, occur in the placenta and decidua during the last months of pregnancy, while they are the most important, are not the only physiological factors which are worthy of consideration in this place. It has been shown that during the last eight weeks of gestation, there is a gradual rise in the systemic blood pressure of the parturient woman.<sup>2</sup> This rise, which reaches its maximum at the beginning of the last week before delivery, though unimportant in itself, would, when combined with other factors, tend to increase the risk of haemorrhage from the delicate vessels of the retroplacental site. The increased tension however, is to some extent counteracted by the arrangement of the vessels which convey maternal blood to and from the placenta, although Jacquemier<sup>3</sup> thought that in this arrangement was to be found a positive source of danger. He likened the arterial system to a cone, the apex of which was in the trunks of the ovarian and uterine arteries, the base in their ramifications to the uterine walls,

1. Proc: Roy: Soc: Med:, Obst: Sect: Vol. i, p.11.
2. Vogeler, Amer: J. of Obst: 1907, Vol.lv, p.490.
3. Arch: Gen: de Med: 1839, Vol. v, p. 5<sup>e</sup> et seq.

and contended that, in comparison with the arterial supply, the venous trunks through the small uterine and ovarian veins was inadequate, and predisposed to stasis in the sinuses. Webster<sup>1</sup> has pointed to the fact, however, that the force of the blood poured into the intervillous spaces of the placenta is greatly diminished by the tortuosity of the arterioles in the uterine wall, that the diminution is further favoured by the passage of the blood through widely dilated capillary sinuses before it enters the intervillous spaces, and further, that the simple course of the veins, devoid of the tortuosity of the arterioles, is such as to favour the removal of the blood from these spaces as quickly as possible. He concludes, moreover, by observing that the intervillous circulation "is probably not a swift flowing, pulsating stream, but a steadily moving mass of blood", and that it is "So conditioned as to be largely independent of sudden changes in the maternal vascular system".

Exactly how far the physiological factors are operative in predisposing towards detachment of the placenta it is impossible to say. That they are not without importance is at least suggested by the increasing liability to detachment which exists as gestation advances. Thus in my series of 61 cases in which the period of gestation is given, 1 occurred in the 4th month, 2 in the 5th, 3 in the 6th, 12 in the 7th, 23 in the 8th, and 20 in the 9th or at term. In other words 32.7 % of the cases occurred at the end of gestation, and 70.4 % after the beginning of the 8th month. These figures are corroborative of those of Holmes<sup>2</sup>, who in a much longer series of cases found 33.1 % at the end of gestation.

1. Human Placentation, p.89.
2. Op: Cit: p.763.

PATHOLOGICAL CAUSES.

The pathological like the physiological causes of accidental haemorrhage exert their influence by producing a weakening of the adhesions between the placenta and the uterus. Like them they seldom act alone, they are predisposing causes. They differ, however, from the physiological causes in that they are operative throughout the whole course of utero-gestation, and may lead to detachment of the placenta and haemorrhage at any time. The physiological causes, as we have seen, are limited in their activity to the later months, when, however, they are present always in greater or less degree.

The most important of the pathological causes associated with accidental haemorrhage is undoubtedly decidual endometritis. Kaltenbach and Veit<sup>1</sup> indeed declare that without its presence placental detachment cannot occur. It may show itself primarily, in the course of pregnancy, either as a result of the acute infectious fevers, or of a passive hyperaemia due to malposition of the uterus, or it may be secondary to a pre-existing endometritis, due to disease or to inflammatory and subinvoluntary changes associated with past labours and abortions. The latter variety is by far the most common, and, in the majority of cases, takes the form of a chronic catarrhal process, giving rise, as Spiegelberg<sup>2</sup> pointed out, to the thin albuminous discharge seen most frequently during the last months of pregnancy. The acute form arising during pregnancy almost invariably produces abortion, especially when occurring in connection with the acute exanthemata, and is, consequently, seldom met with in the later months<sup>3</sup>.

1. Müllers Handbuch für Geburt: Vol ii, p.86.
2. Op: Lit: Vol. i, p.411.
3. Jelllett. Manual of Midwifery, p.480.

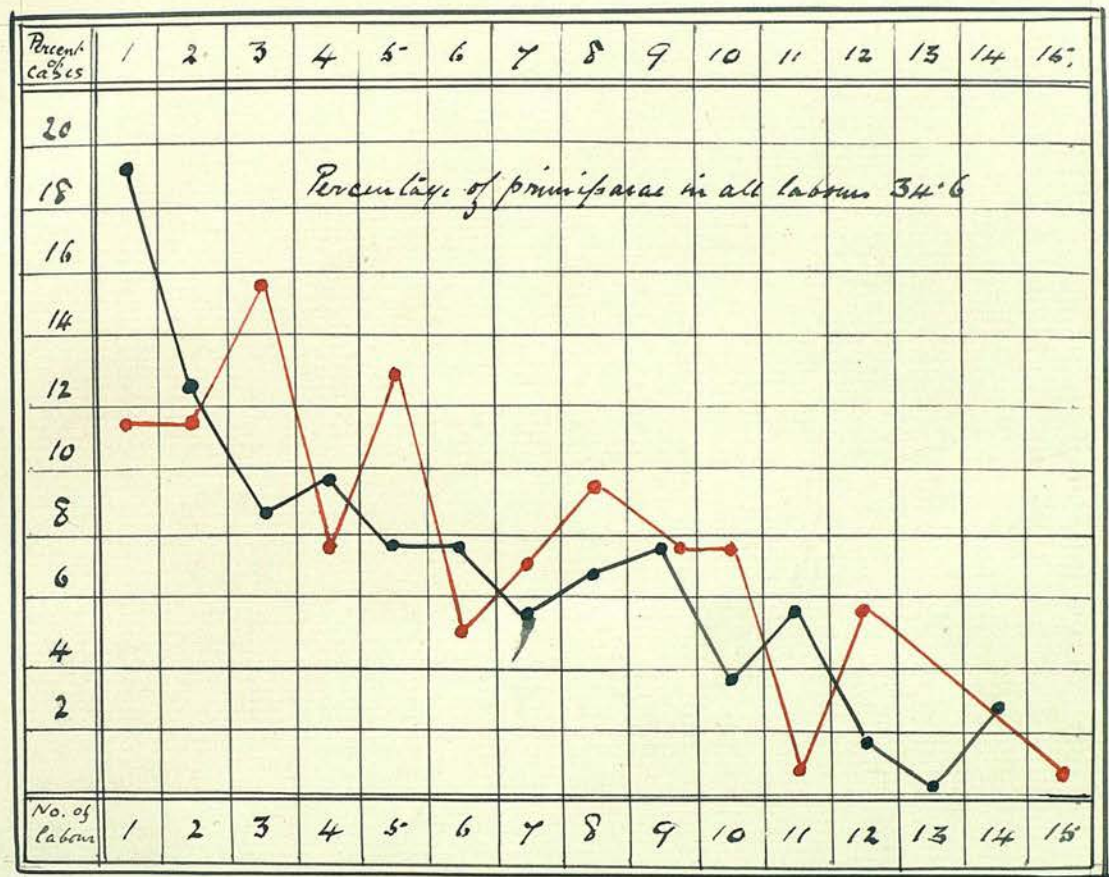
The liability of multiparae, especially those of the poorer classes, to attacks of accidental haemorrhage suggests very strongly an association between premature detachment of the placenta and endometritis, to which such women are particularly prone. The comparative immunity enjoyed by primiparous women against attacks of accidental haemorrhage has often been proved, and will be seen by a reference to Chart 1, in which the percentage of primiparae in 15345 labours at the Rotunda is compared with that of 105 cases of accidental haemorrhage at the same hospital and during the same period<sup>1</sup>. The percentage of the former is 34.6, of the latter 19.04. In my own series the primiparae numbered only 14.2 per cent. Although, as Holmes<sup>2</sup> has said, the older a woman grows the more likelihood exists of endometritis, a reference to Chart 2 would seem to show that age does not necessarily increase the tendency to this complication, the age of incidence of accidental haemorrhage and that of all labours being almost exactly similar, as seen by the curves on the chart.

Decidual endometritis has been demonstrated histologically in connection with accidental haemorrhage by Weiss<sup>3</sup> and Gaston<sup>4</sup> among others, but clinically it can seldom be recognised and is consequently overlooked. It is only mentioned as a cause in three of my cases, though from the previous history of many of the patients there is presumptive evidence of its having been present.

In addition to endometritis, Weiss<sup>5</sup> has described a condition of exudative myometritis, which was present in two of his cases. In both instances there was obstinate postpartum haemorrhage, to which one of the patients succumbed, the other only being saved by

1. Reports in Dublin Journal of Med: Sci:.
2. Op: Cit: p.763.
3. Archiv: f. Gynec: Vol.xlvi, p.259
4. Ann: de Gynec: 1906. Vol.iii, p.682.
5. Ibid.

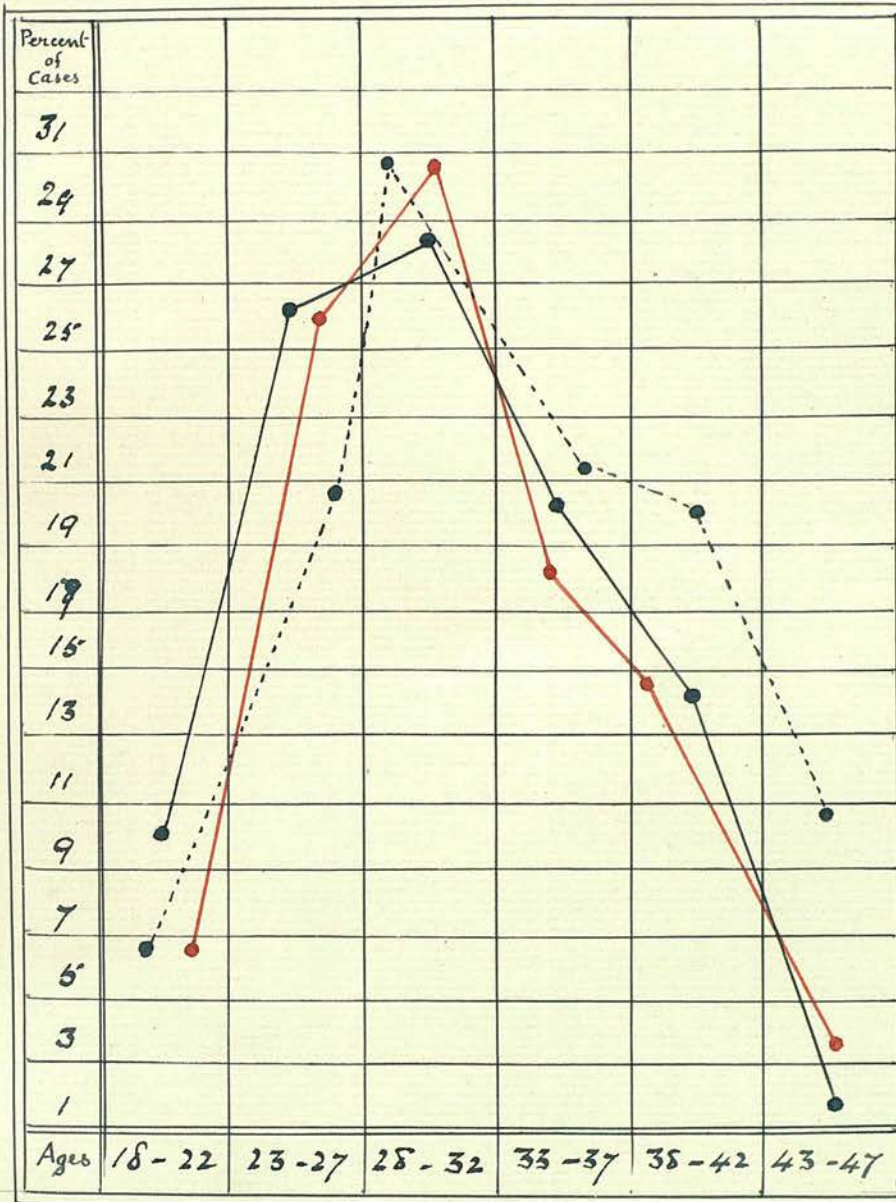
CHART I



Black = accidental haemorrhage; Red = placenta praevia.

CHART showing parity of both accidental haemorrhage and placenta praevia, prepared from the statistics of the Rotunda Hospital over a period of eight years.

CHART II



*Black - accidental haemorrhage : Red - placenta praevia : Dotted - all labours.*

CHART showing the age of incidence of accidental haemorrhage and placenta praevia compared with that of 1,000 labours attended by the Royal Maternity Charity of London.

the performance of Poro's operation. The condition is an exceedingly important one clinically, and would vastly increase the danger both before and after delivery from spontaneous rupture in the first place, and, in the second place, from post-partum haemorrhage.

In 1885 Winter<sup>1</sup> published three cases showing the relation which exists between nephritis and premature separation of the placenta. His paper attracted a considerable amount of attention, and gave a great impetus to the study of the etiology of this condition. His observations have been confirmed by a great many writers, and Jardine<sup>2</sup>, Bue<sup>3</sup>, Weiss<sup>4</sup>, Gaston<sup>5</sup> and Brodhead<sup>6</sup>; among others, have recognised albuminuria as chief among the causes of accidental haemorrhage.

While to Winter is generally given the credit of being the first to point to albuminuria as a cause of premature detachment of the placenta, cases had occasionally been recorded before his time, in which the two conditions co-existed, and one of these reported by Weatherley<sup>7</sup> in 1878, is included in my series. In this case, however, although there was presumptive evidence of nephritis in the shape of oedema of the legs, and scanty urine, the author does not appear to have associated the kidney condition with the haemorrhage as a possible causal factor. On the other hand, Playfair<sup>8</sup>, in 1882, distinctly mentions albuminuria as a possible cause of accidental haemorrhage, and, as far back as 1858, Johnson and Sinclair<sup>9</sup> recognised it as the cause in one of their cases.

1. Zeit. fur Geburt. u. Gynak. 1885. Vol.xi, p.398.
2. Glasgow Med. Jour. 1892. xxxvii, p.421.
3. Am. Jour. of Obst. 1894. xxx, p.598.
4. Arch. fur Gynak. xlvi.
5. Ann. de Gynec. 1906, p.667.
6. Med. Rec. N. Y. 1897. p.292.
7. Case 80.
8. Sci. & Pract. of Mid. 1882. Vol.ii, p.100.
9. Practical Midwifery. 1858. p.354.

Blott<sup>1</sup> referred to albuminuria as a predisposing cause of post-partum haemorrhage, and observed that albuminuric patients bled more freely than others in abortion.

Of 49 cases in my series, in which the cause is stated, albuminuria is only mentioned in 12, and in 1, as I have said, there was presumptive evidence of its presence. The number of cases, however, in which the occurrence of albumen is noted by some authors, especially among those of the French School, would lead one to believe that were the condition looked for, and were the urine examined in every case, albumen would be found very much more often than it is. Thus Rousseau Dumarcel<sup>2</sup> noted it in 11 out of 13 cases of accidental haemorrhage, in the Clinique Bandeloque it was present in 24 out of 31 cases, and Gaston<sup>3</sup> found it in 30 out of a series of 70 cases.

Although the frequent association of albuminuria with premature placental detachment is strongly suggestive of a causal relationship between the two, yet it does not prove it, and some authors have considered that the combination is probably, in many cases, an accidental one. Whitridge Williams<sup>4</sup> is of this opinion, "for", as he states, "if renal lesions played anything like the prominent part assigned to them by Winter and his followers, premature separation of the placenta would be frequently observed, since nephritis complicating pregnancy is by no means uncommon." It is evident then, that, although the importance of albuminuria in this connection is becoming more and more recognised, some doubt still exists on the subject, and this doubt can only be removed when the whole chain of evidence has been placed on a satisfactory patholog-

1. De l'Albuminurie chez les Femmes encientes. 1849.
2. Ribemont Dessaigne & Lepage. Précis d'Obst. p.746.
3. Op: ~~lit~~: p.675.
4. Obstetrics. p.806.

ical basis. The chief difficulty arises from the lack of knowledge as to the part played by Albuminuria in the production of placental detachment. Some writers, following the example of Fehling, ascribe it to the formation of fibrinous infarcts in the placenta. Many others among whom are Weiss, Bué and Gaston have cited cases in which albuminuria and accidental haemorrhage were associated, not with placental infarction, but with inflammatory changes in the decidua, while others, (Winter, Rousseau Dumarcel, and Coudray) have noted the connection between haemorrhage into the substance of the placenta, retroplacental haemorrhage, and albuminuria. It is probable from these facts that there are various ways in which albuminuria may bring about accidental haemorrhage, and that, as far as we can see at present, there is no one factor more particularly associated with it than another.

It would appear that the form of albuminuria most likely to give rise to this complication is that of chronic nephritis. Definite pathological changes in the placenta and decidua are certainly more likely to arise in this condition than in the more transitory form of albuminuria associated with pregnancy. At the same time cases have been recorded in which albumen has been present in the urine for only a short time before and after delivery, and which can only be accounted for by referring in a vague way to the effects of toxæmia. In this connection Szasz<sup>1</sup> has advanced the theory that histological modifications of the placenta leading to detachment and haemorrhage may occur secondarily to death of the foetus, the absorptions of toxins from the dead foetus causing the maternal changes. Gaston<sup>2</sup> has cited a

1. Quoted by Gaston. Op. Cit. p.670.  
 2. Ibid. p.670.

case in support of this theory, which, however, does not accord with the statement of Whitridge Williams<sup>1</sup>, that in certain cases of eclampsia the death of the foetus during pregnancy is followed by the recovery of the mother.

Various other maternal diseases have been associated with accidental haemorrhage, the most important of which is syphilis. This condition, while it is one of the chief causes of early abortion is, no doubt for this reason, less often associated with haemorrhage in later pregnancy. It occurred in only two of my cases, Holmes<sup>2</sup> noted it four times, and Gaston<sup>3</sup>, out of 70 cases, found it once. It is probably then, as Jellett<sup>4</sup> observes, not so common a cause of detachment as has been suggested. Hydramnios was present in 10 of Holmes' cases. According to Dührssen<sup>5</sup> it may cause detachment during labour from the rapid diminution in the size of the uterus on evacuation of the Liquor Amnii, and Bue<sup>6</sup> thinks that the rapid increase in the size of the uterus, which occurs in acute hydramnios, may tear the placenta away from its attachments, especially if it be altered. As a complication of accidental haemorrhage its importance consists in the atonic condition which it induces in the uterine muscle, and which would greatly increase the danger both before and after delivery.

In recent years attention has been drawn to a condition of chronic metritis, in which degenerative and fibrotic changes have been found in the vessels and intermuscular fibrous tissue of the uterus, in cases of obstinate menorrhagia in multiparae. The condition was first described by Reinicke<sup>7</sup>, who observed it, postmortem,

1. Obstetrics. p.539.
2. Op. Cit. p.764.
3. Op. Cit. p.675.
4. Op. Cit. p.683.
5. Manual of Obst. Pract. p.179.
6. Arch. de Tocol. et de Gynec. No: 7. 1894.
7. Semaine Med: 1897. Vol. xvii, p.46.

on several occasions, in women who had suffered from intractable menorrhagia. Targett<sup>1</sup> observed it in the microscopical examination of curettings, and, quite recently, it has been again alluded to by Dr Frank Taylor<sup>2</sup> as a cause of uterine hæmorrhage. Such a condition, if present, in the pregnant uterus of an elderly multipara, would certainly predispose to placental detachment, and may possibly be the cause of some of the more serious hæmorrhages in this connection.

Heart disease, by causing a passive congestion in the vessels of the utero-placental site, may act as a predisposing cause of detachment. Blacker<sup>3</sup> has recorded a case of double mitral disease, in which, at the tenth week of utero-gestation extensive hæmorrhages took place into the placenta, decidua *vtra*, *reflexa* and serotina, and Barnes<sup>4</sup> saw a case in which accidental hæmorrhage was associated with fatty degeneration of the heart.

#### TRAUMATIC CAUSES.

Having now discussed the predisposing causes of accidental hæmorrhage under the heads of the Physiological and the Pathological, we are in a position to enquire into the nature of those factors which are regarded as exciting causes, and which take the form of the various traumatisms which are likely to happen to the pregnant woman, and to lead to disruption of the utero-placental relations.

Traumatisms produce their effect either directly, by causing injury to the uterus and placenta, or indirectly, by causing sudden and perhaps repeated changes in the pelvic blood pressure. Except in the case of gross injuries produced by falls or blows upon the abdomen, it is ~~possible~~ <sup>probably</sup> that traumatisms never act alone as causes

1. Guy's Hospital Gazette, 1904. xviii, p.25.
2. Practitioner, 1909. Vol. lxxxii, p.341.
3. London Obst. Trans. Vol. xlii, p.235.
4. Obst: Operat: p.510.

of placental separation. Their action depends, in the vast majority of cases, upon the presence of some physiological or pathological condition, by which the utero-placental adhesions are weakened and rendered liable to rupture. Given such a condition, the most trivial accident may play the part of a determining factor, and be sufficient to set in motion the train of events which may, perhaps, end in a fatal hæmorrhage.

To enumerate all the possible forms of traumatism, which may lead to this result, would be wearisome and unnecessary; they are legion, and include nearly every known accident to which humanity is prone. The most commonly mentioned, however, are falls, blows upon the abdomen or elsewhere, running, jumping, over-lifting, stretching, straining at stool, etc. Such accidents are to be found associated with the great majority of reported cases, and, because of their obvious nature, have been much exaggerated in importance, both by the public and by the older writers.

Among the traumatic causes, which produce their effect by causing sudden changes in the blood pressure, are to be mentioned coitus, and powerful emotions, such as grief, anger, alarm, and even excessive joy. In addition to the vascular changes to which they give rise, they also probably act by setting up spasmodic and irregular contractions of the uterine muscle<sup>1</sup>, and would predispose to detachment when the utero-placental adhesions were already weakened. In the case of coitus, there may also be added an element of direct injury, as in a case of my own (case 4) in which violence was used by the husband who was under the influence of drink at the time of the act, and in which, as far as one could tell, the patient was perfectly healthy.

1. Gaston. Op. cit. p.673.

Barnes<sup>1</sup> and Spencer<sup>2</sup> in particular have drawn attention to the importance of emotional causes, the latter observer stating that he had several times known detachment to follow a fright, attributing it to a sudden reflex uterine spasm, which separates part of the placenta.

In the same manner probably such causes as severe paroxysms of coughing, vomiting, and violent straining efforts produce their effect, the abdominal contents being compressed by the contraction of the diaphragm.

Shortness of the cord has been adduced by most authors as a cause of detachment. The cord may be absolutely short, as in a case related by Graefe<sup>3</sup>, in which it measured only 31 centimetres, and in which partial detachment apparently occurred at the time that descent of the head into the pelvis took place; or it may be relatively short. In the latter variety the abnormality is due to twisting of the cord round some part of the foetal body or limbs, as occurred in one case in my series<sup>4</sup>. The mode of action of such a condition is purely mechanical, the placenta being dragged away from its attachments during the descent of the foetus into the pelvis; and is similar to that produced when attempts are made to deliver the placenta by pulling on the cord after the birth of the child. It is interesting to note that in the cases alluded to the first was that of a primipara, and in the second there had only been one previous labour, a fact that would seem to suggest the possibility of a presumably healthy placenta being detached in this way. Instances of this sort, however, are exceedingly rare. In my own collection shortness of the cord was only noted as a

1. Op. Cit. p.510.
2. Obst. Trans. xxxv, p.339.
3. Zeit: für Geburt: u. Gynak, 1892, p. 429.
4. Case 27

cause in one case; Goodell<sup>1</sup> met with it six times in 106 cases; but Gaston<sup>2</sup> in his series of 70 cases mentions it as often as 12 times.

Although in those cases in which accidental haemorrhage can be definitely traced to traumatism, the effect usually follows quickly upon the cause, this does not always happen, and hours and even days may sometimes elapse before symptoms appear. The fact was first pointed out by Ramsbotham<sup>3</sup>, and has since been referred to by other authors. Edgar<sup>4</sup> met with a case in which haemorrhage did not occur for several days after an accident, and a patient of Maish's<sup>5</sup> had an attack of bleeding two days after having struck her abdomen against a table. Barnes<sup>6</sup> alludes to this delay in the symptoms as occurring after nervous shock, and explains it by supposing that a slight extravasation takes place at the time of the accident, which, acting as an irritant to the uterus, produces extended contractions a little later. If this supposition be correct it would no doubt account for cases in which, after perhaps a day of severe exertion, or after some slight injury, the patient retires to bed in good health, to be awakened later on to find that she is flooding.

#### MORBID ANATOMY.

The morbid anatomy of accidental haemorrhage has been partly hinted at in dealing with the causes that bring about this condition. We have seen that certain changes, both in the decidua and in the placenta, are commonly found in association with this form of haemorrhage, that these changes may be either of the nature of

1. Am. Jour. of Obst. Vol: ii, p.328.
2. Op. Cit. p.675.
3. Quoted by Herman. Difficult labour, 1899. p.289.
4. Pract. of Obst. p.239.
5. Case 48
6. Obst. Operations, p.510.

degenerative processes, or of inflammatory exudations, and, further, that they conduce to haemorrhage by causing a weakening of the normal utero-placental adhesions, whereby these adhesions are readily broken down and the vessels of the placental site laid open.

As to the manner in which detachment of the placenta actually occurs some doubt still appears to exist. Whether it arises primarily, as a result simply of some sudden increase in the pelvic blood pressure, as Gaston<sup>1</sup> suggests, or whether, as Schickele<sup>2</sup> holds, it depends on uterine contractions, and occurs secondarily to these, is not certain. The latter view is very similar to that expressed by Robert Barnes,<sup>3</sup> as far back as 1851, in his well known paper on Fatty Degeneration of the Placenta. He observed that the diseased placenta, owing to irregularities in its consistence, is unable to follow the movements of the uterine walls, and that, in consequence, the cohesion between the uterus and placenta is destroyed at those parts where the "fatty" masses are hardest. The effusion, which results from this disruption, acts as a foreign body, exciting the uterus to greater activity, by which the detachment and consequent haemorrhage is increased. This view, expressed in terms of the modern theory, advanced by Berry Hart,<sup>4</sup> as to the manner in which the placenta separates normally in the third stage of labour, amounts to this, that, as the uterus contracts and expands alternately there comes to exist a disproportion between the more or less solid areas in the placenta and the placental site, with the inevitable result of detachment, and is perfectly in accord with that theory. It is possible that both these views are correct, and

1. Annales de Gynec. 1906. iii. p.694.
2. Quoted by Gaston. Ibid. p.694.
3. Medico Chir. Trans. 1851. xxxiv, p.194.
4. Selected papers on Gynec. and Obst. p.115.

that the more sudden and profuse haemorrhages may occur from sudden rupture of one or more of the placental sinuses, the result of increased blood pressure associated with decidual disease or degeneration, while those that occur more slowly may arise in the manner described by Barnes, and more recently by Schickele.

In whatever manner detachment of the placenta arises, it is certain that, in most cases, it tends to be progressive. In some cases, it is true, thrombosis of the sinuses occurs, the process ceases, and labour terminates without further haemorrhage. This has even been known to happen after a severe attack of bleeding. If the haemorrhage continues, one of two things happens. Either the blood makes its way past the margin of the placenta, between the membranes and the uterine wall, and so escapes, giving rise to an external haemorrhage, or else it is confined within the cavity of the uterus, being unable from one cause or another to escape, when the condition becomes one of internal or concealed haemorrhage. In the vast majority of cases the amount of haemorrhage depends on the extent to which the placenta has been separated; although, in rare cases, as will be shown later, the entire placenta may be detached without the occurrence of haemorrhage.<sup>1</sup>

As given by Goodell,<sup>3</sup> concealment of haemorrhage may occur under four different circumstances. (a) The placenta may be centrally detached, the blood accumulating in the cul de sac formed by the firm adhesion of its margin to the uterine wall. (b) The placenta may be so detached, that the blood escapes into the uterine cavity behind the membranes near the fundus. (c) The membranes may be ruptured near the detached placenta, allowing the effused blood

1. See pages 36-37.

2. See page 37

3. Amer: Jour: of Obst: 1869. Vol. ii, p.322.

to mingle with the liquor amnii. (d) The presenting part may so accurately plug the maternal outlet, that no existing haemorrhage can escape externally. To these four possibilities Holmes<sup>1</sup> has added a fifth originally suggested by the elder Bandelocque<sup>2</sup>, viz: the conglutination of the uterine orifice; and, while he admits the feasibility of (a), (b) and (d), he takes exception to (c), on the ground that the pressure within and without the membranes being equal, provided there be no pathological weakening of the chorion and amnion, rupture of the membranes is impossible, so long as they remain intact at the os. A case, however, is reported by Korman<sup>3</sup> in which this form of internal haemorrhage actually occurred. The patient, a multipara, having died in labour, postmortem Caesarian section was immediately performed, when it was found that the blood had entered the amniotic cavity, through a rent in the membranes, and caused enormous distension without discharge of the liquor amnii.

Several cases have been recorded in which central detachment of the placenta has occurred, the blood being confined to the retro-placental region by marginal adhesions, and of these the most notable is that of Albinus<sup>4</sup>, whose case has become classical. Another case frequently quoted is that reported by Oldham<sup>5</sup>, the placenta from which is still to be seen in the museum of Guy's Hospital. The quantity of blood which may accumulate behind the placenta is sometimes surprisingly large. In the case cited by Gant<sup>6</sup> the clot weighed from 1½ to 2 lbs, while Bue<sup>7</sup> states that a clot of 1200 grms. may be formed in this situation.

Plugging of the outlet by the presenting part frequently occurs.

1. Amer: Jour: of Obst: 1901. xliiv, p.765.
2. Midwifery. Trans. by J. Heath. Vol. ii, p.83.
3. Quoted in Amer: Syst: of Obst: Vol. ii, p.64.
4. Quoted by A. Bandelocque. Traité des Haem: Interne de l'Uterus, 1831. p.35.
5. See case 53
6. See case 2
7. Amer: Jour: of Obst: 1894. xxx, p.598.

and is often the cause of partial concealment of the hæmorrhage. It was well shown in my own second case, in which, after the membranes were ruptured, there was no bleeding until the head was pushed up, when the blood gushed out with considerable force.

Another possible source of internal hæmorrhage, but one that is seldom met with, is bleeding into the amniotic cavity from rupture of the umbilical cord. Baudelocque<sup>1</sup> mentions this factor, and cites a case of his own, in which rupture of the cord had taken place. He also quoted two other cases, one observed by Levret, and the other by De La Motte, in the former of which rupture of the cord, in the latter rupture of a varix of the cord had been the cause of internal bleeding.

These ideas constitute what may be termed the obstructive theory of concealed accidental hæmorrhage, as distinct from the opinion held by Lusk,<sup>2</sup> Jellet<sup>3</sup>, and others, that concealment is due, not so much to the presence of some obstacle to the outflow of blood, as to an atonic state of the uterine muscle, to the absence of the vis a tergo, rather than to the presence of the vis a fronte, and that the blood, in consequence, accumulates passively in the cavity of the uterus. This view, while it may answer in certain individual instances, is not applicable to the majority of cases; and, it is certain that in many cases the uterus may be acting powerfully, may, in fact, be in a state of tonic contraction, without there being any external hæmorrhage. This occurs more especially in those cases in which the presenting part acts as a dam, and in which the more powerful the uterine contractions may be, the more effectually will the outlet be blocked and the escape of blood prevented.

1. Op. Mit. p.87.
2. Sci: & Art of Mid: 1892. p.607.
3. Manual of Mid: ~~189~~ . p. 684.

SYMPTOMS.

The symptoms of accidental haemorrhage vary greatly in intensity, depending on the amount of the effusion, and on whether the blood is retained in the uterus or not. The most severe cases are those in which there is total concealment of the haemorrhage, for in them we have, in addition to the effects of the blood loss, the distension of the uterus with its attendant pain and collapse. Few obstetrical complications present symptoms of a more alarming nature than do these cases, and in few is the patient's life in greater danger. The clinical picture they present is an impressive one, and once witnessed is not likely to be forgotten. The patient, who is usually a multipara, may be suddenly seized when about her work with a feeling of faintness, accompanied perhaps with severe abdominal pain. There may be vomiting, or purging, or she may become unconscious. The pain may gradually increase, and the patient complain of an intolerable anguish. If seen at this time she is found cold and collapsed, with quick, feeble and compressible pulse. Her face is of a waxy hue and covered with beads of sweat. Her expression is anxious. Her breathing is shallow, rapid and interrupted with sighs. She is restless, throws her arms about, and complains of pain, which she describes as of a continuous, tearing, rending or stretching character, quite unlike the normal pains of labour. The abdomen is distended, hard as a board, and so tender that even the gentlest palpation is resented. If palpation be possible, the uterus will be found to be oval or globular in shape, of a woody hardness, and extending further towards the costal margin than normally. The foetal parts cannot be felt, nor can the heart be heard on auscultation. There may be a slight discharge of blood, or blood stained serum, from the vagina, or this may be entirely absent. If the membranes can be felt through the os they

are often found to be tense and bulging, and they do not become relaxed, as in the intervals between the normal contractions. If suitable treatment be applied the patient may rally somewhat, and it may be possible to effect delivery. Or the symptoms deepen in intensity; she becomes dyspnoeic, crying out and struggling for air; the pulse flutters and becomes imperceptible; cold clammy sweat covers the surface of the body; she complains of a darkness before her eyes; and, lastly, she sinks into a coma and with a few convulsive movements expires.

Such then is the picture presented by a severe case of concealed haemorrhage, and it is a fortunate circumstance that such cases are rare, and that the majority are of a mild or moderately severe type, in which, although the danger exists, it can be modified and often removed by suitably applied treatment.

From the above description it will be seen that there are three symptoms which are most prominent, and which, occurring in a woman at or near the term of gestation, form a tripod on which the diagnosis of concealed haemorrhage may be based. These symptoms are collapse, distension of the uterus, and pain, and it may be well before going further to enquire briefly into their nature, even though such enquiry entail some repetition.

Collapse is the most prominent feature of concealed accidental haemorrhage, and is present, in greater or less degree, in practically every case. It is shown by faintness, extreme pallor, weakness of the pulse, restlessness and dyspnoea, symptoms which obtrude themselves very forcibly upon the observer, and give to the condition its peculiarly distressing character. Goodell<sup>1</sup> has shown that it is due to the excessive distension of the uterus, and to

1. Op. Cit. p.329.

the pressure thus brought upon the adjacent viscera, rather than to the loss of blood, which in these cases is sometimes insignificant. Thus in six of his fatal cases the amount of internal haemorrhage was estimated in quantities ranging from four ounces to one quart, quantities scarcely likely to produce any appreciable effect in themselves, when one considers the amount of blood often lost with impunity by the parturient woman. Barnes<sup>1</sup> drew attention to the serious symptoms which may follow sudden distension of the uterus, and cited cases in which death, which he attributed to this cause, had occurred from the use of the intrauterine douche, in which a sufficient outlet for the fluid had not been provided.

Pain is almost invariably present, is usually severe, and accompanied by abdominal tenderness. Like the collapse it is due to the distension of the uterus, and in some cases to the actual tearing of its fibres. It is described as a tearing, rending, stretching or bursting feeling, and, unlike the pain produced by the normal contractions of labour, is continuous in character. It is seated in the lower abdomen and loins, and may radiate down the thighs. In some cases it may be localised to a particular region in the wall of the abdomen, and may furnish an indication as to the position of the placental site. At this spot, it is often stated, there occurs, in cases in which the haemorrhage is confined beneath the placenta, a rounded prominence on the surface of the uterus, but, except in women with thin and lax abdominal walls, this sign would be difficult to elicit.<sup>2</sup> It is only mentioned in one of my cases.<sup>3</sup> Combined with the positive symptom of continuous pain is the negative one of entire absence or great

<sup>1</sup> *E.* Obst: Operat: p.446.

<sup>2</sup> Playfair. Sci: & Art of Mid: 1882. Vol. ii, p.101.

<sup>3</sup> *E.3* ~~Case~~ See Case 3.

feebleness of the pains of labour. This point is regarded by both Goodell<sup>1</sup> and Hicks<sup>2</sup> as one of great importance as an aid to diagnosis. Of Goodell's cases in only twelve were the pains normal from the outset.

Enlargement and distension of the uterus is another symptom frequently mentioned. In Goodell's series it was present in 42 cases. It is a symptom however which would be very difficult to determine at or near term, unless the patient had been recently seen, and the size of the uterus noted. At an earlier period of gestation it has been observed, and in my series there are two instances in which it was shown to exist. In one, the fundus reached to the umbilicus at the 4th month<sup>3</sup>, and in another<sup>4</sup>, at the 5th month, the size of the uterus corresponded to that of a seven months' pregnancy. Playfair<sup>5</sup> and Goodell<sup>6</sup> mention a remarkable case related by Chevalier, in which a three months' foetus was found embedded in coagula, which had distended the uterus to the size of a nine months' gestation, postmortem Caesarian section having been performed under the impression that the pregnancy had advanced to term.

The uterus may be of a woody hardness, or it may be boggy, the fact depending probably more on the presence or absence of extreme distension, than, as Holmes<sup>7</sup> thinks, on that of tonic contraction or atonicity of its walls. In one of my cases<sup>8</sup> a feeling of crepitation was noted over the surface of the uterus.

1. Op. Cit. p.335.
2. Obst: Trans: Vol.ii, p.75.
3. Case 78
4. Case. 58
5. Op. Cit. Vol.ii, p.101.
6. Op. Cit. p.336.
7. Op. Cit. p.788.
8. Case. 38

Of other symptoms it is only necessary to mention two, the discharge of serum, and the tense state of the membranes. The former is due to the retention of clots within the uterus, and is regarded by Holmes<sup>1</sup> as almost pathognomonic of detachment. Branton<sup>2</sup> drew particular attention to the tense and bulging condition of the membranes, in which there is no periodical relaxation as in the intervals between normal contractions. As a diagnostic symptom, when present, this should be of some value, though it could scarcely be elicited until after a certain amount of cervical dilatation had taken place.

In cases in which external and concealed haemorrhage are combined, these symptoms are usually present in a greater or less degree, according to the amount of blood which is accumulating within the uterus. It is of the utmost importance to remember, as Goodell pointed out, that in any case of apparently frank external haemorrhage internal bleeding may at the same time be occurring, and that the amount of blood appearing at the vulva is no index of the severity of the attack. This should rather be gauged by the intensity of the shock, and is often in inverse proportion to the amount of external bleeding.

Practically every case of external haemorrhage is concealed to begin with. If the amount of concealed bleeding be slight there may be no symptoms until the blood appear. On the other hand the attack may be ushered in with signs of internal haemorrhage, which may persist for some time, until, at length, the diagnosis, which has perhaps been obscure, is rendered certain by the appearance of haemorrhage from the vagina. Or again, an external may be converted into a concealed haemorrhage. This occurred in my own second case,

1. Ibid. p.768.
2. London Obst: Trans: Vol. viii, p.288.

through blocking of the outlet with the foetal head. The possibility of such an occurrence, and the grave consequences to which it may lead, will again be referred to when we come to deal with treatment; for it is a point round which much of the controversy regarding this part of the subject of accidental haemorrhage is centred.

In the external variety of accidental haemorrhage, the chief, and often the only symptom, is loss of blood. This may be considerable, although its amount is often greatly exaggerated by the patient and her friends. It is often the first thing noticed, or as we have seen, it may not appear for some time. In the former case profuse, and even alarming haemorrhage, may suddenly occur, without apparent cause, and without the slightest warning. This may happen when the patient is going about her duties, or it may occur during sleep. Coe<sup>1</sup> has recorded cases in which bleeding suddenly began in the course of normal labour, and a case of the same sort is included in my series<sup>2</sup>. Ramsbotham<sup>3</sup> pointed out that while haemorrhage seldom occurs for the first time between rupture of the membranes and the birth of the head, it may come on in the interval which elapses before the uterus again acts to expel the shoulders and body of the child.

Slight attacks of haemorrhage may occur in the later weeks of gestation without interfering with the nutrition of the ovum, and may pass unnoticed. If they recur, however, they usually lead to premature separation of the placenta with its accompanying symptoms. A remarkable case is recorded by Parvin<sup>4</sup>, in which a blow on the

1. Trans: Am: Gynec: Soc: 1891. p.16.
2. Tweedy. Case 49.
3. Princip: & Pract: of Obst: Med: & Surg: 1867, p.414.
4. Sci: & Art of Obst: 1895. p.392.

abdomen was followed by a severe haemorrhage, amounting to "nearly a quart in a few minutes," accompanied by the usual signs of collapse; but in which the patient recovered, went to term and was delivered of a healthy well developed child. Parfoyl<sup>1</sup> also cites a case in which, four weeks before labour, severe haemorrhage occurred. The patient was found lying unconscious on the floor by her husband, whose attention was attracted by seeing blood running from beneath the door of the room in which she lay. In a very prostrate state she was admitted to the Rotunda, but in a week was able to return home. In this case the foetus was macerated and sodden when delivered. Two cases are recorded by Hirst of Philadelphia<sup>2</sup> in both of which there was long continued haemorrhage in the latter half of pregnancy, from a partially detached placenta, without labour intervening. In both cases blood clot formed extending from the margin of the placenta to the external os, and this, becoming infected from without, gave rise to symptoms of septicaemia. Both children were born alive.

While, as we have seen,<sup>3</sup> the loss of blood is usually dependent on the extent to which the placenta is separated, cases have occasionally been reported in which complete separation has taken place without the occurrence of haemorrhage<sup>4</sup>. Holmes<sup>5</sup> included two such cases in his series, and explains the phenomenon on the hypothesis that thrombosis had occurred in the uterine sinuses before the separation took place. More remarkable still is the fact related by Spiegelberg<sup>6</sup> that in such cases the child may possibly be born alive, provided delivery occur within ten minutes of the separation. But such an occurrence must, as he admits, be excessively rare.

1. Dub. Jour, of Med. Sci. 1901. Vol.iii, p.248
2. Med. News. Philadelphia. 1893. Vol.lxiii, p.97.
3. See p. 28
4. Hart. Selected papers in Obst. & Gynec. p.132
5. Op. Cit. p.767.
6. Text Book of Mid. Syd.Soc. 1887. Vol.i, p.550.

DIAGNOSIS.

There are various conditions, apart from pregnancy, which may produce hæmorrhage, and which must be excluded before a diagnosis of placental separation can be arrived at. As a rule this offers no difficulty. Hæmorrhage arising from such conditions as cancer of the cervix or body of the uterus, from mucous polypi, urethral caruncle, or traumatism, should be readily excluded by examination and by the history of the case. The actual diagnosis lies between accidental hæmorrhage and placenta prævia. I have already<sup>1</sup> shown how difficult, even impossible, this may be, if we regard as accidental hæmorrhage only those cases which fulfil the exact anatomical definition of the condition; and I would repeat that, for clinical requirements, a diagnosis depends simply on whether placental tissue can or cannot be felt on sweeping the finger round the lower segment of the uterus. One should not omit to state, however, that this method of diagnosis is far from being a satisfactory one; for there are cases of placenta prævia in which the placenta has become thinned out and membranous, and in which, although the entire os may be covered by placental tissue, we may be unable to recognise it by touch, so deceptive is the sensation which it communicates to the examining finger. As an instance of this I may cite a case which I recently communicated to the Obstetrical Section of the Royal Society of Medicine<sup>2</sup>, in which the entire gestation sac was delivered at the 28th week, showing the existence of a membranous placenta prævia, which, from the hard and smooth surface it presented, could not be distinguished, antepartum, by the finger. Apart from this, placental tissue is not difficult

1. Page 4.

2. Proc. Roy. Soc. Med. Obst. Sect. Vol. i, p. 314.

to distinguish. The only thing with which it is liable to be confounded is blood clot, which, however, is easily broken up by the finger, and does not present the stringy, spongy feeling of placental tissue. In cases in which the cervical canal is closed, we may be able to feel the boggy mass of placenta in one or other fornix. The diagnosis is assisted by the fact that, after a severe haemorrhage in cases of placenta praevia, the internal os is usually sufficiently dilated to admit of exploration with the finger, even before the end of pregnancy<sup>2</sup>.

In concealed haemorrhage, the diagnosis is often a matter of great difficulty, a fact which has contributed largely to the high mortality of the affection. The conditions which are most likely to lead to mistake are rupture of the uterus or of some other abdominal organ, severe colic, fainting attacks and acute hydramnios. Uterine rupture in the vast majority of cases occurs late in labour, and after rupture of the membranes, and usually produces characteristic symptoms. Difficulty however might arise in cases of detachment of the placenta occurring in labour, in which the symptoms might closely simulate those of rupture<sup>3</sup>. The cases which give rise to the greatest trouble are undoubtedly those of spontaneous rupture occurring at the commencement of labour, and in which it might be impossible to arrive at a diagnosis before delivery. Such cases are rare, but are met with from time to time, and cases have been recorded by Professor Simpson<sup>4</sup>, Milne Murray,<sup>5</sup> and other writers. An interesting case is reported by Callender<sup>6</sup>, in which symptoms closely resembling those of concealed haemorrhage started when the patient had been in labour six hours, and before

1. Eden. Manual of Mid. 1906. p.332.
2. Eden. Ibid.
3. Holmes. Op. Cit. p.770.
4. Contrib. to Obst. & Gynec. 1880. p.140.
5. Jour. Obst. Gynec. Vol.i, p.142.
6. Edin. Med. Jour. 1906. xix, p.443.

completion of the first stage. The membranes were ruptured and a dead foetus delivered with forceps. The third stage was normal, and there was no undue haemorrhage. After delivery, exploration of the iliac region with a needle showed the presence there of a quantity of blood, which had evidently come from a vascular rupture in the peritoneal coat of the uterus. In this case the presence of albuminuria was noted, a fact that rather lent colour to the diagnosis of concealed accidental haemorrhage. A somewhat similar case is cited by Brideau<sup>1</sup>, in which a rupture of varicose veins on the posterior surface of the uterus was found to have occasioned the symptoms. In my second case the patient and her friends were inclined to attribute her collapsed state to poisoning by fish, of which she had eaten a hearty meal shortly before the onset of symptoms. The loss of blood which she had sustained earlier in the day, however, furnished the clue to what might otherwise have been a difficult diagnosis.

Holmes<sup>2</sup> has suggested, as a means of clearing up the diagnosis in doubtful cases of colic or fainting, the use of the haemoglobinometer and blood counter. Such investigations, however, are quite out of place in so serious an emergency as that with which we are dealing, and are not worthy of serious consideration.

Budin<sup>3</sup> has drawn attention to rupture of the circular sinus of the placenta as a cause of bleeding before labour, and excited, by his monograph on the subject, a considerable amount of attention in France. Both Jacquemier<sup>4</sup> and Matthews Duncan<sup>5</sup> regarded this accident as a frequent cause of haemorrhage in placenta praevia.

1. Bull. Soc. d'Obst. 1906. ix, p.365.
2. Ibid. p.770.
3. Femmes en couches et nouveau-nés. 1897. p.125.
4. Arch. Gen. de Med. 1839. ~~viii~~, p.330.
5. Mechanism of Natural and Morbid Parturition. 1875. p.387.

When it occurs in the normally situated placenta it is not to be distinguished clinically from other forms of accidental haemorrhage, the circular sinus being liable to be torn, in common with other retroplacental sinuses, in the process of detachment of the placenta.

#### PROGNOSIS.

There is no doubt that the mortality of accidental haemorrhage has been greatly exaggerated. This is due in great part to a misapprehension which would appear to have arisen from the frequency with which the older statistics, and more especially those of Goodell, are quoted by writers. The high mortality which his cases showed has been taken as a standard of the mortality of accidental haemorrhage as a whole, without apparently any attempt on the part of writers to enquire into the conditions which gave rise to so high a percentage of deaths. Goodell's figures do not in any way represent the percentage mortality of all cases of accidental haemorrhage; nor were they ever intended to do so. His cases were all of the most severe type, either entirely or partially concealed, and, naturally, showed a high death rate. They occurred, moreover, at a time when the condition was little understood, and many were not diagnosed before death. Of his 54 fatal cases in no less than 41, or 72%, death occurred before delivery. Such results would scarcely be possible under modern conditions, and it is time that these older figures ceased to be quoted, for they are no more applicable today than are the statistics of Caesarian Section compiled in the days before the introduction of antiseptics.

At the same time we cannot blind our eyes to the fact that accidental haemorrhage is an exceedingly dangerous complication, and that in a relatively large proportion of cases it proves fatal.

What this proportion actually is, it is naturally very difficult to ascertain; for it depends upon a variety of circumstances which cannot always be defined statistically. One finds that in any series of cases collected from the literature the proportion of deaths is much higher than in cases attended in hospitals. In the one case the percentage is probably considerably above, in the other considerably below, what we may consider the normal or actual percentage. Cases that find their way into the literature are generally those that are reported for some peculiar interest they may possess. They are generally severe cases, and are often fatal. At the same time, there are probably hundreds of cases occurring in general practice, which are never reported, chiefly because of their mild and uninteresting nature. In hospitals, on the other hand, records are kept of all cases, mild as well as severe, and this, along with the better conditions under which the patients are treated, brings the percentage of deaths to a very low figure.

I have attempted to arrive at an approximate estimate of the mortality, both in private and in hospital practice, by taking figures from four different sources, two of which give cases treated under the best possible conditions in hospital, the other two of cases collected from the literature, the majority of which occurred in private practice. As a result of these observations we get an average percentage mortality as seen in the table for the mothers of 20.27 and for the children of 69.21.

MORTALITY TABLE, A.

Source of Cases	Mothers		Infants	
	No: of cases	Deaths	No: of cases	Deaths
Holmes <sup>1</sup> . . .	189	61	202	158
Author . . .	72	23	73	63
Queen Charlotte's Hospital. <sup>2</sup>	78	2	78	36
Rotunda Hospital <sup>3</sup>	105	4	105	60
Total .	444	90	458	317
Percentage deaths	20.27		69.21	

In the following table the deaths occurring in each of the three varieties of haemorrhage are shown from my series of 72 cases, in which the result to both mother and child are stated. One being a case of twins the number of children exceeds that of the mothers by one. I have omitted those cases, 10 in number, which were obtained from hospital reports, and which were obviously reported as fatal cases.

MORTALITY TABLE, B.

Variety of Haemorrhage	Mothers			Infants		
	Cases	Deaths	%	Cases	Deaths	%
External . . . .	29	6	20.68	29	22	75.86
Mixed . . . .	32	12	37.5	33	31	93.95
Concealed . . . .	11	5	45.45	11	10	90.90
Total . . . .	72	23	31.94	73	63	81.38

1. Ibid. p.770.
2. Queen Charlotte's Hospital Clin. Reports. 1905 to 1907.
3. Rotunda Clinical Reports in Dublin Jour. of Med. Sci. 1900 - 1907.

The figures in the above table, though taken from a comparatively small series of cases, bear out the fact of the much greater mortality attendant on the concealed than on the external variety of haemorrhage, the deaths from the former being more than twice as many as those from the latter. The foetal mortality is exceedingly high, and, in my cases, was highest in those with mixed external and concealed haemorrhage; though the figure 93.95 % is somewhat modified by the fact that in five of the cases the infants had not reached a viable age. In two other cases the infants were unviable, so that out of a total of 73 children with 63 deaths, 7 were premature.

It is of interest to see how the mortality of accidental haemorrhage compares with that of other complications of labour, and, from a paper read by Dr Boxall before the Obstetrical Society of London, we are able to glean some information on this point. In this paper the author gives tables showing the mortality in childbed at the General Lying-in Hospital, York Road, for the 25 years from 1879 to 1904. Out of a total of 11,186 deliveries, there were 53 deaths. Of these 23 were attributed to the accidents of childbed, the remaining 30 being due to sepsis and incidental causes. Of the former, four deaths were due to accidental haemorrhage. According to these figures then this complication, which only happens about once in every 350 labours, is accountable for 7.5 % of all deaths occurring in childbed, or, as compared with the other accidents of labour, for 17.3 % of deaths. Comparing the number of deaths from accidental haemorrhage with the number of labours, the death rate may be said to stand at .35 per 1000, which is no mean figure, when we consider that the total deaths in

1. Lond. Obst. Trans. Vol. xlvii, p.196.

childbirth number only from 3.9 to 5.4 per 1000.<sup>1</sup> Accidental haemorrhage contributes largely to the risk which attends the late labours of multiparae, which risk Barnes<sup>2</sup> showed increases rapidly after the 5th labour, until by the 8th it is equal to that attendant on the labours of primiparae.

The prognosis in accidental haemorrhage depends on a variety of circumstances, and each case must be judged on its own merits. When there is some gross pathological lesion present, that interferes with the normal contraction and retraction of the uterine muscle, the risk will obviously be greatly increased. So also is it when the cervix is undilatable, or when the haemorrhage begins early in labour, in great amount, and before the dilatation of the os has begun.

The causes of death are various, but the most frequent is collapse. Of my 33 fatal cases it was the most prominent cause of death in 14. It may prove fatal either before or after delivery. In the latter case it may or may not be conjoined with postpartum haemorrhage, which is only mentioned as a cause of death in 5 of my cases, in one of which it did not occur for three hours after delivery. Parvin<sup>3</sup> has emphasized the fact that, even in the absence of postpartum haemorrhage, the danger is not always over though the uterus be emptied, and quotes two cases, one reported by Grapon, and the other from Schauta's clinic, in which the patient succumbed shortly after delivery though no fresh haemorrhage occurred. This point has an important bearing on the treatment, and is well brought out in my series, in which, in 10 instances,

1. Williams. Deaths in Childbed. Lancet, 1904. Vol. i, p.1703.
2. Lond. Obst. Trans. Vol. i, p.311.
3. Sci. & Art of Obst. 1895. p.394.

although the uterus contracted well after delivery and there was no postpartum haemorrhage, the patients succumbed in from a quarter of an hour to five hours after the birth of the child, from shock, collapse, or some similar cause. Tweedy<sup>1</sup> has reported three cases in which death occurred after normal labour from what he calls labour shock, in which there was no excessive haemorrhage. If this be possible under such circumstances it is not surprising that it should happen in such a condition as accidental haemorrhage, where shock is one of the most marked and prominent features. In one of my cases, quite recently reported by Dr Keyworth<sup>2</sup>, death occurred as a result of intraperitoneal haemorrhage, and this case will be again referred to<sup>3</sup>. In one case death occurred from pernicious anaemia, in one from the effects of uraemia, and in one from septicaemia 34 days after delivery. Eight patients succumbed before delivery was completed.

- 
1. Dublin Jour. of Med. Science, 1907. Vol.civ, p.107.
  2. Case 72
  3. See page 68

TREATMENT.

For clinical purposes cases of accidental haemorrhage may be divided into two classes - the mild and the severe. In the first class may be included all cases of slight, or comparatively slight external haemorrhage, in which the constitutional symptoms are not marked, the cervix is dilated, or is soft and dilatable, and the pains of labour are already in progress. The severe cases, on the other hand, include those of profuse external, of combined external and concealed, and of totally concealed haemorrhage, in which there is marked collapse and signs of great, and it may be, prolonged blood loss, and in which the os is rigid or closed and the pains entirely absent. The treatment of these two types is often in substance identical, varying simply according to circumstances. The same general principles apply to all cases, though each case must be regarded individually and treated on its own merits.

Slight attacks of haemorrhage occurring before labour may be treated by palliative measures, though even these require the most careful supervision. It should never be forgotten that the most mild and apparently simple case may suddenly be converted into one of the utmost severity, an event for which we should always be prepared. The patient should be kept in bed, and absolute rest enforced even for some days after all bleeding has ceased. The diet should be light, stimulants avoided, and the bowels kept open by mild aperients. Where there is much mental excitement sedatives are indicated, of which the most useful are the Bromides or an occasional dose of opium. The patient should be warned against exerting herself during the remainder of her pregnancy, and, on the slightest recurrence of haemorrhage, should go to bed and send

at once for assistance. If the haemorrhage recur, or is at all severe, palliative measures are not permissible, and labour should at once be induced. By this means if the child be viable its life as well as that of the mother may often be saved, a condition of things that is usually impossible after repeated attacks of haemorrhage. In the severe cases until the second stage of labour is passed, the indications for treatment are mainly three:- (1) To check the bleeding and encourage labour; (2) To improve the general condition of the patient and combat shock; and (3) to effect delivery. After the birth of the child our aim should be to counteract the tendency to collapse, which, as we have seen, so often proves fatal, and to guard against the occurrence of postpartum haemorrhage.

The controversy which rages round the treatment of accidental haemorrhage has for its centre the first of these heads, namely the means which we are to adopt to arrest the haemorrhage and to bring about uterine contractions. On this point opinion is divided between the two rival methods of puncture of the membranes and vaginal plugging. Nor does there seem any likelihood of a speedy ending to the contest, which, in recent years, has received a fresh stimulus at the hands of the Dublin School. This controversy is no new one, and may be said to date back to the time when Rigby wrote his essay drawing the distinction between the two forms of antepartum haemorrhage. The influence of Braxton Hicks and of Goodell, both of whom advocated puncture of the membranes, would appear to have turned the scale in favour of this method, which held undisputed sway in this country and America until <sup>Smully</sup> Langley, in 1894, reintroduced the method of vaginal plugging, which has since

gained such hold in the home of its adoption. Neither method can be said to be new, the operation of vaginal tamponade as now employed being simply a modification of that originally advocated by Leroux<sup>1</sup> as far back as 1776. Rupture of the membranes was first employed, according to Robert Lee<sup>2</sup>, by Manriceau, who in the year 1682, adopted it in preference to immediate delivery by turning, the practice advocated in all cases of haemorrhage, irrespective of the position of the placenta, by Guillemeau, and before him by Ambrose Paré .

Without going further into the history of the treatment, a good account of which is given by Lee in the work already alluded to, I shall endeavour to examine, as briefly as possible, the evidence for and against the two rival methods; though one enters with reluctance upon a subject already so well debated.

Rupture of the membranes has always had, in spite of opposition, many powerful advocates. Barnes, Hicks, Playfair, Simpson and a host of other writers have declared in its favour as the best method of treatment; and, at the present day, the weight of opinion, as expressed by the text books, shows how deeply rooted is the hold that the method has gained on the minds of obstetric teachers. Nor is all this weight of authority to be lightly cast aside. A form of treatment advocated as the result of the experience of so many generations of obstetricians may truly be said to have stood the test of time, and it is doubtful whether it can ever be supplanted by the Dublin method, strong as is the evidence which this School has brought to bear in favour of vaginal plugging<sup>3</sup>.

1. Holmes. *Op.cit.* p.775.
2. Lect. on the Theory & Pract. of Mid. 1844. p.382.
3. Berry Hart. *Obstetrics in the 20th Century.*  
*Jour. of Obst. & Gyneec. of the Brit. Emp. Vol.i,p.57.*

It is generally stated that rupture of the membranes produces its effect by inducing labour pains and so checking the bleeding from the uteroplacental site; but it is urged against its employment that in the stretched <sup>and</sup> atonic condition of the uterine walls, this effect is not produced, and further, that, by allowing of the escape of the liquor amnii, the intrauterine pressure is lowered and the haemorrhage thereby increased.

At first sight these objections would appear to be unanswerable, for we cannot deny the fact that rupture of the membranes does not always immediately induce contractions, nor can we deny that, under certain circumstances, haemorrhage has been known to take place into the uterus after the membranes have been ruptured. Theoretically, therefore, we are at a disadvantage. But is this so practically? In the first place, although uterine contractions may not and often do not start at once, it is certain that rupture of the membranes is followed, in the vast majority of cases, by cessation of the bleeding. On this subject Ingleby<sup>1</sup> wrote, "The haemorrhage was in every instance arrested, and delivery was accomplished by the natural powers. Although in several of these instances pains did not arise for some hours, the passive contraction speedily took place, by which the uterus became much firmer as was manifest by placing the hand over the abdomen." In one of the cases recorded by Johnson and Sinclair<sup>2</sup>, pains did not begin for 16 hours after the membranes were punctured, yet the procedure was followed by cessation of the bleeding which did not recur.

It is evident therefore that we are not dependent on uterine

1. Treatise on Uterine Haemorrhage, 1832. p.129.
2. Practical Midwifery. p.357.

contractions, in the sense of labour pains, for the arrest of haemorrhage, and that, this being the case, one of the chief objections raised against rupture of the membranes falls to the ground.

But how are we, in the absence of such contractions, to explain the fact that the haemorrhage ceases when the membranes have been ruptured? Were the uterus merely a bag filled with fluid, whose walls, when that fluid was removed, remained distended and flaccid, rupturing the membranes would be the worst possible form of treatment, for then indeed we should expect the blood to be poured into the vacant space, until the uterus was once more full. But the uterus is a muscular bag. Its walls, distended by fluid pressure, are capable, when that pressure is removed, of shrinking down on their contents. This shrinking is due partly to the elasticity of the walls, partly to their inherent reflex tonicity, which, as Horrocks<sup>1</sup> has shown, is possessed by uterine muscle in common with every other muscle in the body, and partly to retraction. The elasticity of the uterine walls, made up of the combined elasticity of its muscular its serous and its mucous coats is slight in amount<sup>2</sup>, and probably unimportant in this connection, though Jacquemier<sup>3</sup> considered that it contributed to the shrinkage of the uterus at the beginning of labour.

There is no reason to believe that the reflex tone of the muscle fibres, depending as it does on the integrity of the nervous mechanism, is impaired or lost when the muscle becomes stretched or distended by excessive fluid pressure within the uterus, provided that pressure be not long continued. If the pressure be kept up, however,<sup>4</sup> in other words, the membranes be not ruptured

1. Jour. of Obst. & Gynec. of the Brit. Emp. Vol i, p.37.
2. Matthews Duncan. Trans. Obst. Soc. Lond. Vol.xxviii, p.117.
3. Accouchements. Vol. i, p.187.

sufficiently early, the nerve fibres supplying the muscles as well as the muscles themselves suffer from the stretching, the reflex arc is interfered with, and paresis of the muscle occurs. Apart from this, so long as the distension lasts, neither the elasticity nor the reflex contractility of the uterine walls is able to come into play, and, as a consequence, the uterus becomes more and more stretched and its fibres less and less capable of acting. On timely removal of the pressure, however, the muscle fibres recoil, and this recoil is immediately followed by retraction, which, as was shown by Matthews Duncan<sup>1</sup>, may begin as a mere tonic tightening of the uterus but continues throughout labour as a permanent and progressive force. The power of retraction, as this author<sup>2</sup> has shown, is the greatest haemostatic we possess in the third stage of labour, when it produces complete and permanent closure of the vessels leading to the placental sinuses. Even in the early stages however, it is probably not without an important effect on these vessels, though Guerin Valma<sup>3</sup> believes that it cannot be in any way depended on as a means of checking haemorrhage until the uterus is entirely emptied. Spiegelberg<sup>4</sup>, on the other hand, ascribes to its action the absence of haemorrhage in those cases in which the placenta of a first twin is expelled before the birth of the second, and those in which prolapse of the placenta takes place before the birth of the child. In these cases, as in those of accidental haemorrhage where the bleeding ceases on rupturing the membranes, the partial retraction acts probably by so increasing the kinking of the curling arteries in the uterine wall as to diminish, though it may not altogether arrest, the flow of blood through them.

1. Ibid. p.117.
2. Ibid. p.122.
3. Bull. Soc. d'Obst., Paris. Vol.vi, p.129.
4. Text Book of Midwifery. Vol.ii, p.229.

This effect is readily understood when we remember that, as Webster<sup>1.</sup> has pointed out, the circulation through these vessels, owing to their tortuosity, is never a quick flowing, pulsating stream, and that, therefore, it would readily be diminished by any force tending to further reclusion of the vessels. Such a force, it is easy to imagine, would be supplied by even a slight amount of retraction on the part of the muscular fibres, by which, as Eden<sup>2.</sup> has shown, the vessels in the uterine walls are surrounded, and which form an important element in the musculature of those walls. The permanent diminution and slowing of the blood stream is of the utmost importance, for by its means thrombosis in the sinuses is rendered possible, as would not be the case were we dependent merely on a condition of intermittent contraction and relaxation of the muscular fibres.

Another important effect of retraction is that of bringing the placenta, beneath which the haemorrhage is taking place, down upon the body of the foetus, and so compressing it. As a possible factor in causing arrest of the haemorrhage, placental compression was objected to by Sir James Simpson<sup>3.</sup> on the ground that, in some cases, the body of the foetus may be so disposed as not to be capable of producing it. If the fluid be all drained away, however, and, as was held by Ingleby, the treatment is ineffectual unless this is allowed to occur, whatever be the relation of the foetus to the placenta, the bleeding surfaces will be sufficiently approximated to allow of the occurrence of thrombosis, which, as we have seen, has already been favoured by the process of retraction.

1. Human Placentation. p.90.
2. Manual of Midwifery. p.46.
3. Collected Obstetrical & Gynec. Works. Vol.i, p.69.

We can now state, therefore, that, in spite of the fact that the pains of labour do not always follow immediately upon rupture of the membranes, this operation has, in the great majority of cases, the effect of checking the haemorrhage, and I have attempted to explain how this occurs. I have said nothing, however, as to the alleged danger of producing fresh haemorrhage by evacuating the waters, and so lowering the intrauterine pressure.

This accident, as I have already admitted, does occasionally happen, and is then due to failure of the reflex contractility of the uterus, either from defect in the neuro-muscular mechanism, the result of prolonged over-distension of the organ, or from too rapid and sudden evacuation of the liquor amnii.

It is liable to occur, therefore, in cases of concealed haemorrhage, in which a considerable amount of blood has for some time been accumulating within the uterus. The danger may be avoided, however, as was pointed out by Goodell, by the application of a tight abdominal binder, which, by maintaining the pressure within the uterus, will prevent the occurrence of haemorrhage, and, further, by stimulating the surface of the uterus, will lead to the contraction and retraction of that organ.

The relief of the tension, to which the uterine walls are subjected by the accumulation of blood, has, besides the effect of allowing them to contract, the further very important effect of relieving the collapse, which, as we have seen, is the direct result of the tension, and, further, is one of the worst features of concealed haemorrhage.

When the liquor amnii is rapidly evacuated, the sudden relief of the pressure is liable to lead to increased haemorrhage from

the torn sinuses, the uterus filling up before the muscle has had time to adapt itself to the altered conditions. This may be prevented by allowing the presenting part to act as a ball valve, and so regulating the escape of the "after waters".

From what has been said it will be gathered that rupture of the membranes should be performed early, in order to prevent, as far as possible, the evil effects of prolonged over-distension of the uterus with its accompanying collapse. Many authors, Valma<sup>k</sup> and Holmes among others, have taken the opposite view originally adopted by no less an authority than Baudelocque, that the membranes should be preserved intact until the pains of labour have begun, and the os is sufficiently open to admit the hand. The latter author<sup>1</sup> denied the distensibility of the uterus by internal haemorrhage, and taught that the tendency of such haemorrhage into the cavity of the womb was to excite contraction, which would develop into true labour pains. The same opinion was held by ~~Mons.~~ <sup>Mme</sup> Boivin<sup>2</sup>, who emphasised the doctrine: "That internal haemorrhage in pregnancy, by over-distending this organ is a sure means of determining its contractions; that the disease itself becomes its own remedy; that the internal uterine loss instead of being more dangerous, is less so than an external one."

These ideas have been more recently brought forward by Guerin Valma<sup>k</sup><sup>3</sup>, who also denies the possibility of uterine atony occurring from distension in internal haemorrhage, throws doubt on the haemostatic effect of retraction before the uterus is emptied, and considers that the unruptured membranes, by acting as an "autoplug"

1. L'Art des Accouchements. Paragraph 1086.
2. Quoted by Goodell. Op. lit. p.283.
3. Bull. Soc. d'Obst. Paris. Vol.vi, p.124 et seq.

cause an equilibrium to be established between the blood tension and the intrauterine pressure whereby the haemorrhage is arrested.

Here then we have certain definite ideas based on the same general principle, namely, that atony of the uterus does not occur from over-distension of its walls, and further that this over distension is the best thing that can happen, for, not only does it produce contractions, but it is to be regarded as a means of checking the bleeding.

The unsoundness of such a doctrine however may be readily proved. The condition of the uterus, within whose cavity blood is accumulating, is akin to that found in acute hydramnios. Yet no one, I imagine, would contend that hydramnios tends to increase the contractility of the uterus. That the uterus in concealed haemorrhage is distended and stretched to its utmost capacity is matter of common knowledge. The enlargement of the womb is one of the most familiar symptoms of the complaint. A uterus so stretched and distended, as I have already stated<sup>1</sup>, simply cannot contract; and Goodell<sup>2</sup> has laid it down as an axiom that the pains of labour are generally absent in the worst cases of haemorrhage, and cannot be aroused by the most powerful stimulants and oxytocics so long as the uterus is over-distended.

Again, over-distension of the uterus, far from being a desirable condition and one to be encouraged, is one of the most dangerous features of concealed accidental haemorrhage. Apart from its being the most fruitful source of fatal collapse, there is another and even more pressing danger attendant on it, the danger of rupture.

1. Cf. p.80.

2. Op. Cit. p.344.

The experiments of Matthews Duncan<sup>1.</sup> would seem to show that, so great is the tensile strength of healthy uterine muscle, that spontaneous rupture of it is impossible, yet a case is recorded by Milne Murray<sup>2.</sup> in which such rupture occurred at the beginning of labour in a perfectly healthy uterus. In accidental haemorrhage we have seldom to do with a healthy uterus; and there is no sign by which we shall know in any given case whether the organ is healthy or not. The condition of the uterine wall in the majority of cases is just such as would be most liable to give rise to spontaneous rupture, and many cases have been recorded in which this has actually taken place. Thus in Goodell's series<sup>3.</sup> rupture of the peritoneal coat of the uterus occurred in two cases (cases 1 and 58) as a result of the extreme tension, and he has quoted several other instances of a similar occurrence. In one of my cases the peritoneal coat was torn, and patches of ecchymosis found in the substance of the uterine muscle from the same cause. - (Case 7<sup>3</sup>). How slight a cause may be sufficient to produce a rupture is seen in the remarkable case reported by Sir James Simpson<sup>4.</sup>, in which the accident occurred as the result of the injection of a few ounces of water into the pregnant uterus.

Goodell<sup>5.</sup> showed the importance of early interference by an analysis of his cases; for out of forty-one women who died undelivered, in twenty-five the membranes were unruptured. Out of ninety-three cases, forty-three were left to the unaided efforts of nature, and of these thirty-two, or 74.4 % perished.

I am well aware that many cases of concealed haemorrhage have

1. Mechanism of Normal & Morbid Parturition, p.95.
2. Jour. of Obst. & Gynec. of the Brit. Emp. Vol.i, p.142.
3. Goodell. Op. Cit. p.330.
4. Edin. Med. Jour. 1862.
5. Ibid. p.342.

occurred in which the membranes have been preserved intact; collapse has been treated by means of hypodermics of morphia and atropine, and labour has ended naturally. A typical example of this sort is a case reported by Drs Briggs and Edmiston<sup>1</sup>, and others are to be found in the literature. But in spite of this I contend that, unless we know that we have to do with a healthy uterus, and this there is no means of ascertaining, such treatment is, to say the least of it, risky, and is therefore not to be recommended. While the membranes are intact and the uterus distended, the patient's life is in danger, and the longer this state of things be allowed to continue the greater becomes the danger.

Guerin Valmate founded his opinion as to the danger of early rupture of the membranes on a case in which this occurred spontaneously, and before the patient was seen by her attendant. To class such a case with those in which the membranes are ruptured artificially by the physician, who is able to watch the condition of the uterus, and to apply suitable means of preventing that organ becoming distended with blood after the waters have been evacuated, is obviously fallacious. Yet this is often done, and leads to an unfair proportion of fatalities being ascribed to this form of treatment. I would lay it down as an axiom that spontaneous rupture of the membranes, in the absence of the medical attendant, cannot be regarded in common with artificial puncture, in which means are at hand to avert any possible danger that may arise therefrom.

There is one class of case which one should not omit to mention, and in which the beneficial effect of early rupture of the membranes may reasonably be doubted. These are the cases of con-

1. Lancet. 1908. Vol.i, p.1078.

sealed haemorrhage in which the blood is confined behind the placenta by adhesion of the margin of that organ to the uterine wall. In such cases there is a local atony of the uterus produced over the placental site, and, even on evacuation of the liquor amnii, neither contraction nor retraction can come into play to check the haemorrhage. The sooner the uterus is emptied and the placenta removed the better, for, until this is done, we have no control over the bleeding. To this end the membranes should be ruptured, a tight binder applied, and dilatation of the cervix effected as rapidly as possible. Short of abdominal section which is often impracticable I know of no other form of treatment attended with less risk to the patient, nor do I see any advantage to be gained by waiting for the advent of contractions, which may never occur, before rupturing the membranes. The greatest drawback to early rupture of the membranes is the difficulty and delay which may be occasioned thereby in the second stage of labour. With a closed os and a dry uterus the possibilities of evil are many. Nor is the position improved by the collapse, or by the friability of the uterine walls with which the haemorrhage is so often associated. Fortunately, however, it is rarely that the practitioner is met by any insurmountable difficulties even from this cause. The fact that the condition occurs more frequently in multiparae than in primiparae renders the cervix more often dilatable than would otherwise be the case. Johnson and Sinclair<sup>1</sup> give it as their experience, that, owing to the previous haemorrhage, the os uteri yielded readily to the otherwise inappropriate pressure of the presentation; and Goodell<sup>2</sup> states that "in the majority of cases

1. Op. cit. p.352.

2. Op. cit. p.344.

of uterine flooding the os dilated passively", though "this is due "not to the natural consequences of labour but simply to the flaccidity of the cervix and the surrounding tissues, resulting from "the state of collapse, and also to the vis a tergo of an excessive "uterine distension." In cases occurring before the end of gestation the immature head or breech is almost as efficient a dilator as the bag of membranes <sup>1.</sup>

It cannot be denied however that the loss of the natural hydrostatic dilator may at times lead to serious difficulty and entail the necessity of using artificial means of dilating the cervix. To this end there are, roughly speaking, four methods open to us: (1) Digital dilatation, (2) Dilatation by bags, (3) Dilatation by various instruments, and (4) Incision of the cervix.

The first two of these methods only are in common use. Of the two latter, instrumental dilatation was not employed in any case in my series, and in only one was the cervix incised and delivery completed by Vaginal Caesarian section <sup>2.</sup> This method introduced by Dührssen <sup>3.</sup> in 1896 is inapplicable except to cases treated in hospital; it requires special skill for its performance and even under these circumstances its maternal mortality has been shown to be as high as 20 % <sup>4.</sup>

Various instruments in the form of branched dilators have in recent years been introduced, of which the chief are those of Bossi and DeSeigneux. Good results have been obtained by their employment, but, like vaginal Caesarian section, their use is limited. Like that operation too they tend to add very greatly to the shock and require the use of chloroform for their performance.

1. Herman. Difficult Labour. p.298.
2. Case <sup>57.</sup>
3. *Berlin Klin Wochenschrift.* xxx. 1893, p. 643
4. Eden. Manual of Midwifery. p.456.

Dilatation by means of bags is frequently employed, the instrument generally used being that of Champetier de Ribes. As a cervical dilator and as a means of inducing contractions of the uterus De Ribes' bag is often most effective. In its conical shape and the elastic pressure of its fluid contents it resembles the natural dilator - the bag of membranes. At the same time there are certain disadvantages attaching to its use, which should make one cautious in recommending it, and which considerably detract from its utility. Its great bulk when introduced into the lower uterine segment and distended with fluid is likely to cause displacement of the presenting part, and thus to convert a favourable into an unfavourable presentation. Again there is a danger of the bag causing rupture of the lower segment, an accident which has been known to happen in placenta praevia<sup>1</sup>. Of ten cases in my series, in which the bag was used, it is said to have burst in three, in one of which this occurrence was the actual cause of detachment of the placenta and haemorrhage.

Digital dilatation is the simplest and not the least efficient of these methods, and has been warmly advocated by Whitridge Williams<sup>2</sup>. Except in cases when the os is unusually rigid it is generally successful. When the os is closed, dilatation may be begun by means of Hegar's dilators or the finger, and continued by the method of Harris<sup>3</sup>, until the required amount of dilatation has been reached. This will depend chiefly on whether we wish to complete delivery by means of forceps or version. If the latter method is chosen the amount of dilatation need not be great, for bipolar version can be performed when the cervix will admit com-

1. Eden. Manual of Midwifery. p.335.
2. Obstetrics. 1908. p.808.
3. Harris. Am. Jour. of Obst. 1894. pp.37-49.

fortably two fingers. For this reason version is sometimes to be preferred to forceps delivery; for a leg having been brought down and pulled upon, the half breech will form an efficient dilator and delivery need not be hurried. Of the relative advantages of version and forceps as means of effecting delivery, however, more will be said later when the method of vaginal plugging has been discussed.

In 1895 Dr Farrar of Gainsborough<sup>1</sup> drew attention to the possible value of cocaine as a cervical dilator. He cited two cases of protracted second stage in which the application of a 10% solution of the drug to the cervix was followed in a few minutes by complete dilatation; and three years later he was able to support his former statement before a meeting of the British Medical Association<sup>2</sup>. The method has been tried by various practitioners, but I have been unable to find any published account of their results. Personally I have employed it in a few cases, but have not been able to satisfy myself as to its efficacy. If, however, cocaine has any action of this sort, and is able to produce the results with which Dr Farrar credits it, it should be a most valuable adjunct to our treatment of these cases; and, as it is harmless when applied in this manner and does not interfere with other methods, it should certainly be given a trial.

As a means of assisting uterine action when rupture of the membranes fails to produce the desired effect it has long been customary to resort to the use of ergot, the most valuable of oxytocic drugs.

1. Lond. Obst. Trans. xxxvi, p.321.
2. Lancet, 1898. ii. p.441.

By the earlier writers ergot was invariably recommended, not only for the purpose of exciting immediate contractions, but also as a safeguard against the occurrence of postpartum haemorrhage. Goodell<sup>1</sup> advised its free use on the ground that in grave haemorrhages ergotism cannot be induced; and Johnson and Sinclair<sup>2</sup> stated that in these cases it was given in the usual doses for exciting uterine action,<sup>3</sup> and with more perfect impunity to the child, and advantage to the mother, than could possibly have been expected had it been administered in the first stage of an ordinary labour.<sup>4</sup> Among the more modern writers the statements with regard to the value of ergot are less emphatic; and there is a growing tendency to relegate its use to the third stage as in ordinary obstetric practice, for, as Galabin<sup>3</sup> and Fothergill<sup>4</sup> have pointed out, in states of great collapse, the drug excites a very depressing effect on the heart of the already exhausted patient. Holmes<sup>5</sup> however states as recently as 1901 that accidental haemorrhage is "the one antepartum condition when the drug may be given;" though, he adds, "it should be given guardedly, and never in large doses."

The action of quinine as an *ecbolic* has been very generally overlooked in favour of its more powerful rival ergot. It has however two very great advantages over ergot, the first being that though it increases the strength of the uterine contractions, it does not produce tonic contractions as in the case of ergot; the second that, instead of exerting a depressing effect, it has a markedly tonic action, and is thus exceedingly useful in these as in other cases of lowered vitality. Hammond<sup>6</sup> studied very care-

1. Op. cit. p.346.
2. Op. cit. p.352.
3. Manual of Midwifery. p.437.
4. Manual of Midwifery. p.345. (1896)
5. Op. cit. p.776.
6. Amer. Gynec & Obst. Jour. 1898. Vol.i, p.468.

fully the action of quinine in one hundred cases of labour, thirty-eight of which were primiparae, sixty-two multiparae. Of the 38 primiparae, 35 showed an increase both in the frequency and duration of the contractions after the use of the drug, while of the 62 multiparae, in 57 the interval between the contractions was lessened and in 56 the contractions were increased in duration. In no case was there any tendency to undue contraction of the lower segment of the uterus. That quinine does increase the expulsive action of the uterus I have myself frequently been able to prove, and in the three cases of accidental haemorrhage in which I used it, in combination with rupture of the membranes, powerful contractions were set up which lasted until delivery was completed, in two of the three by the natural efforts. While ergot then is the best drug in postpartum haemorrhage, in haemorrhage occurring during or before labour its place should be taken by quinine, the ecbotic effect of which is not hampered by the disadvantages which attend the use of ergot. The dose of quinine given should be a large one and Macness<sup>1</sup> recommends that eight grains be given in pill form, followed in an hour by four grains, repeated in another hour if necessary. He has used the drug in a very large number of cases and always in these large doses, and has never seen any symptoms of quinism - headache, deafness or noises in the ears produced by it,

To recapitulate, the treatment by rupture of the membranes may be summed up as follows :-

1. The operation does not always produce uterine contractions, though in a large number of cases these follow its performance.

1. Edin. Med. Jour. 1898. N. S. 3. p.519.

2. In the majority of cases haemorrhage is checked by rupturing the membranes and often before uterine action has started.
3. Rupture should always be supplemented by the application of a tight abdominal binder, in order to prevent the occurrence of internal haemorrhage, owing to the lessened intrauterine pressure, and with the object of causing the placenta to be compressed between the body of the foetus and the uterine wall.
4. The membranes should be ruptured early with the latter object in view, and in order to relieve the tension on the uterine walls in concealed haemorrhage, and thus to lessen the tendency to shock.
5. In many cases of a serious nature rupture of the membranes and the application of a binder must be supplemented by other measures, having for their object the dilatation of the cervix and the stimulation of the uterine muscle. Of these measures digital dilatation and the administration of quinine in large doses are the most generally suitable.

It is now necessary to enquire into the plan of treatment by vaginal plugging, which in recent years has come to be associated with the name of the Dublin School, and to attempt in some measure to compare the two methods.

After having for some years been practically abandoned, the use of the vaginal tampon was re-introduced by Smyly in 1894, and fully described by him in a paper read before the British Medical Association at Bristol in the following year.<sup>1</sup>

As now carried<sup>2</sup>, the operation of plugging is far more thorough than that performed by the older writers; and the advocates of the method claim for it that it is far superior to any other as a means ~~both~~ of arresting haemorrhage, dilating the cervix, and exciting labour pains. The process, as described by Colclough<sup>2</sup>, consists in packing the vagina tightly with small tampons of sterilised cotton wool about the size of a small walnut, the patient being

1. *Brit. Med. Jour.*, 1895, Vol. i, p. 63.

2. *Jour. Obst. & Gynec. of the Brit. Emp.* Vol. ii, p. 153.

placed in the lithotomy position. The usual antiseptic precautions are taken and the catheter passed before the plugging is begun. Special care is taken to pack the fornices thoroughly, in such a manner that the cervix is surrounded by a ring of plugs as by a collar. When no more can be introduced into the vagina, which is distended to its utmost capacity, a pad of iodoform gauze is placed over the vulva to keep the plugs in place, and the whole secured by a binder, applied as tightly as possible, and a perineal bandage. It is recommended that the plug be removed in 6 hours, or sooner if it produce much shock and replaced if bleeding recur.

It is claimed for this form of treatment that it checks the bleeding, hastens labour and causes the cervix to dilate. It is further claimed that, by its employment in severe cases, the patient is given the opportunity of rallying before delivery occurs, and that, by this means, the danger of postpartum haemorrhage is obviated. Considerable difference of opinion, however, appears to exist among the advocates of vaginal plugging as to the class of cases in which it should be used, and even as to the manner in which it produces its effect. According to Jellet<sup>1</sup> its application is limited to cases of external haemorrhage, and he states that in the concealed variety its use is "of little avail."<sup>2</sup> He further assures us that, for its success, the uterus must be "healthy." Its walls must be capable of contracting down on its contents, and so preventing the accumulation of blood within its cavity. If applied to a uterus whose walls are atonic and capable of distension, he admits the probability of an external being converted into a concealed haemorrhage. According to this view, then,

1. Manual of Midwifery. p. 688.

2. *Ibid.* p. 686.

the cases in which plugging can be safely employed must surely be extremely limited, for, as Jardine<sup>1.</sup> has pointed out, we rarely have to do with a healthy uterus. The fact that the placenta has separated at all is evidence in itself, in the great majority of cases, that the uterus is unhealthy. Jellett himself gives endometritis as the prime cause of this form of haemorrhage, and a uterus with endometritis is not a healthy uterus.

On the other hand Galabin<sup>2.</sup>, who gives plugging as an alternative to rupture of the membranes in cases in which the os is undilated, states that it is especially suitable for cases of concealed haemorrhage, if uterine action be absent and great collapse exist. He shares the views of Smyly<sup>3.</sup>, Shroeder<sup>4.</sup>, and Spiegelberg<sup>5.</sup> that plugging should not be performed after rupture of the membranes, for fear of converting an external into a concealed haemorrhage. Tweedy<sup>6.</sup> declares that he has found plugging quite as efficient after as before rupture of the membranes, and advocates its use in concealed haemorrhage after rupturing the membranes, to allow of the escape of the blood.

Most authorities are of opinion that the plug controls bleeding by raising the pressure within the uterus, until it equals that of the blood in the systemic vessels. Tweedy<sup>7.</sup> however holds the view that it acts as a tourniquet to the uterine arteries, the arteries becoming bent and their blood-flow impeded. This explanation is purely theoretical, and cannot be accepted until further proof is forthcoming. Moreover it takes no account of the ovarian

1. Lectures on Haem. p.27.
2. Manual of Midwifery. p.438.
3. Op. cit. p. 64.
4. Manual of Mid. trans by Carter. p.309
5. Op. cit. Vol.i. p.533.
6. Rotunda Practical Midwifery. p.124.
7. Trans. Roy, Acad. Med. Ireland. Vol. xvi, 1898. p. 223

arteries. Taking, then, the generally accepted view that the plug acts by raising the intrauterine pressure, and remembering that it has a further action, admitted by all, of acting as a powerful stimulus to uterine contraction, there is a good deal to be said as to the danger of producing such increased tension within a uterus whose walls, already weakened by disease, are at the same time, excited to strong contraction. Such a thing as spontaneous rupture of the uterus is not unknown from slighter causes than this<sup>1</sup>. Nor would it appear to be unheard of at the Rotunda as a sequel to plugging. In one of the 15 cases, of which Colclough<sup>2</sup> gives an account, the patient was plugged at 2 a.m. for mixed haemorrhage; at 8 a.m. pains came on; an hour later the patient suddenly became collapsed. The plugs were removed and spontaneous delivery occurred after the membranes had been ruptured, when a large rent was found in the left fornix, running up into the left broad ligament, from the effects of which the patient died very shortly afterwards.

A case illustrating very clearly the fact that, apart from actual rupture, very extensive damage to the tissues surrounding the uterus may result from tightly plugging the vagina, has quite recently been recorded by Dr Keyworth,<sup>3</sup> and is included in my series. In this case the patient died seven hours after delivery from intraperitoneal haemorrhage, and, on post mortem examination, very extensive extravasation of blood was found in both broad ligaments, extending from the level of the internal os up to the fundus, through the mesosalpinx and around the tube. The case was reported on by the Pathological Committee of the Obstetrical Section of the

1. Cf. p. 57.
2. Op. cit. p. 167.
3. Case 72

Royal Society of Medicine, who conclude with the statement that:-  
 "We have not found any breach of surface, or the actual source of  
 "the haemorrhage, but are of opinion that the whole of the haemorr-  
 "hage was due to the pressure exerted on the uterus whilst the  
 "vagina was tightly packed".<sup>1</sup>

It is repeatedly stated that the method of vaginal plugging does not lead to the danger of converting an external into a concealed haemorrhage. That this danger however is by no means unknown is seen by the following case, which is included in my series.<sup>2</sup>

The patient was admitted to Queen Charlotte's Lying-in Hospital, having been seen by the district midwife, who had plugged the vagina for slight haemorrhage. Her condition was good, pulse 108, uterus not distended, and foetal parts felt. An anaesthetic was given, the plug removed and the vagina douched with lysol. The cervix admitted three fingers, and the membranes were intact. Slight oozing continued. The vagina was tightly packed with gauze and a tight perineal band and binder applied. Almost immediately after she became extremely collapsed, blanched and restless, pulse scarcely perceptible, and respirations sighing. The uterus was found to have risen to the ensiform cartilage. The plug and binder were immediately removed, when very slight external haemorrhage was noticed. The membranes were ruptured and podalic version performed, a leg being brought down and steadily pulled upon. The usual means to promote stimulation were adopted, and delivery was completed about 15 minutes after rupture of the membranes. Immediately afterwards a large amount of bright red blood-clot and blood followed. The placenta was found lying loose in the cavity of the

1. Proc. Roy. Soc. of Med. Obst. Sect. Vol.ii, p.112.

2. See Case 41.

uterus. The uterus contracted, there was very little haemorrhage after the birth of the child, but the patient died two hours after her admission to the hospital.

In <sup>these other</sup> ~~four~~ cases in my series in which plugging was employed, (cases 47, 48 and 57) it was followed by symptoms, more or less marked, pointing to the accumulation of blood within the uterus; but, as in these cases there is no mention of the use of the binder, I merely mention them without laying stress on them.

<sup>1.</sup> Kolz has reported two cases, in which vaginal plugging for uterine haemorrhage was fraught with evil consequences. In the first the operation was performed for haemorrhage at the third month. The patient a few minutes later became collapsed and the uterus distended. It was emptied, but death ensued in an hour. In the second case the patient's life was only saved with difficulty severe collapse following the introduction of a tampon for haemorrhage from a fibroid uterus. A large quantity of clot was removed from the uterine cavity and the bleeding checked with hot injections.

With regard to the question as to the induction of labour pains by the vaginal plug, Tweedy<sup>2.</sup> affirms that it is rapid, probably from the accumulation of CO<sub>2</sub> in the uterine muscle, the result of compression of the vessels. Colclough<sup>3.</sup>, however, has given a table which would appear to directly contradict this statement: for out of 36 cases in which the time of delivery after plugging was stated in only 4 did it occur under four hours, while in 9 delivery was delayed from 4 to 7 hours, in 12 from seven to twelve hours, in 8 from twelve to twenty-four hours, and in 3

1. Edin. Med. Jour. 1890. i, p.764.
2. Trans. Roy. Acad. of Med. Ireland. Vol.xvi, 1898. p.224.
3. Op. cit. p.158.

cases beyond twenty-four hours. Of these 3 cases the times were twenty-six hours, three days, and nine days.

One of the greatest dangers, if not the greatest danger of all, in accidental haemorrhage is shock. In many of the fatal cases death has occurred from this alone. Treatment therefore to be rational must be aimed at minimising shock by every possible means, and those forms of treatment which in themselves involve least shock must be preferred. Now no one can possibly deny the fact that, in a woman already collapsed, the introduction of a vaginal plug, characterised by Herman<sup>1.</sup> as a "clumsy and painful" form of treatment, can possibly be accomplished without increasing the shock. Tweedy and Wrench<sup>2.</sup> tell us that "the efficiency of the "plug depends on the efficiency with which we ram the cervical ring "of pledgets up towards the uterine artery". The process of "ramming" plugs of cotton wool into the vagina, which is a sensitive organ, until its walls are distended to their utmost limit, and then of forcing the uterus down onto this solid mass, by means of a "properly applied" binder and perineal band is scarcely compatible with minimising shock. Nor do these authors deny that the plug produces shock; but even go so far as to state that<sup>3.</sup> "the "patient will not properly respond to your attempts to restore her "until you remove the plug." Clearly then the plug is not an ideal form of treatment. Tweedy<sup>4.</sup> has reported a case in which the patient in the early stage of labour was attacked with severe external haemorrhage. The vagina was tightly plugged and a tight binder applied, but before the operation was ended she had become collapsed. Stimulants and saline injections were administered

1. Difficult Labour. p.301.
2. Rotunda Practical Midwifery. p.124.
3. Ibid. p.124.
4. Dub. Jour. Med. Sci. 1905. Vol. ci, p.407.

without effect. The plug was removed, the membranes ruptured and bipolar version performed; but death occurred before delivery was completed. The symptoms appeared to indicate internal haemorrhage which, however, it was found, had not occurred, and it is more than probable that we must place to the account of the plugging the collapse which caused the death of the patient.

As a form of treatment in general practice, especially among the poor, plugging the vagina is utterly unsuitable. To begin with the operation is not so simple as the advocates of the measure would have us believe. The vagina is extremely distensible, and it is difficult to pack it so tightly as to prevent the escape of blood, without causing a considerable amount of pain and discomfort to the patient. The pressure of the vaginal walls is apt to compress the plug which becomes a <sup>slipping</sup>~~slipping~~ ball past which the blood will flow.<sup>1</sup> The patient is likely to object strongly to the plug, and in many cases absolutely refuses to submit to it a second time, when the first plugging has failed to check the bleeding. Moreover it is by no means easy to render the vagina and the external genitals surgically clean, especially in the houses of the poor, and, unless this can be done, the danger of sepsis must necessarily be very great - greater indeed than in most other obstetrical operations. When plugging is resorted to the most careful supervision of the patient is necessary during the whole time that the plug is in position, for, not only is it necessary to watch for the occurrence of haemorrhage past the plug, and for bleeding taking place internally, but we must be ready when pains begin to remove the plug, if we are to guard against the accident of ruptured uterus.

1. Herman. Op. cit. p.319.

Whilst this is easy enough in hospital with a multitude of assistants it is otherwise in practice for obvious reasons.

It is not always possible to compare the value of two different methods of treatment of such a condition as accidental hæmorrhage by means of statistics. Figures are often most misleading and may be especially so in such a case as this. Many things must be taken into account before we can arrive at a just estimate of the true meaning of the figures adduced. The circumstances under which the cases occurred, the severity of the cases, and the skill of the individual practitioners should all be considered. It is unfair to draw comparisons between cases treated in a hospital by skilled surgeons, surrounded by everything that can possibly be required in the way of equipment and assistance, with those treated in the slums of cities, or in the depths of the country, where the very reverse obtains. Nor can I help thinking that many of the adverse opinions that have been formed of the older method of treating accidental hæmorrhage have been founded very much on these lines. The statistics of Braxton Hicks and of Goodell, statistics based on cases, many of which occurred under the worst possible circumstances, both as regards the patients and as regards the practitioners who attended them, are placed beside those of modern hospitals replete with every convenience, to the obvious disparagement of the former. When however we compare the results of cases occurring as nearly as possible under similar conditions, we shall find that the method of rupturing the membranes and the method of plugging the vagina show results that are not so widely dissimilar as the advocates of the latter insist; and we shall be more inclined

to believe that the low deathrate obtained at the Rotunda Hospital is due, more to the favourable conditions under which the treatment is carried out, than to any particular merit in the treatment itself. In the Rotunda Hospital<sup>1.</sup>, for instance, from the year 1897 to the year 1906 there were 105 cases of accidental haemorrhage treated, with 4 deaths, i.e. with a death-rate of 3.8 %. If we compare these figures with those of Queen Charlotte's Hospital<sup>2.</sup> in London, we find that in the last three years, 1905 - 1907, there occurred 78 cases, of which 2 were fatal or 2.56 %. At this hospital vaginal plugging is not carried out as a routine practice, and was employed in only 9 of the 78 cases. On the other hand one of the two fatal cases was treated, as I have already related<sup>3.</sup>, by plugging, and the result was clearly traceable to the method of treatment. Johnson and Sinclair at the Rotunda Hospital in the days before the introduction of the plug, and moreover in the pre-antiseptic days, had a death-rate of 4.69 % in 81 cases, in which rupture of the membranes was the almost universal treatment employed. In my series of 84 cases the membranes were ruptured (as part of the treatment, not merely as a preliminary to performance of version) in 25 cases. Of these 4 were fatal. The type of haemorrhage was external in 9, mixed in 12, and concealed in 4, so that the majority were presumably serious cases. In 15 cases, spontaneous delivery followed puncture, in 9 operative measures were required to effect delivery, and in 1 death took place before delivery was complete. Of the four fatal cases the first was a severe concealed haemorrhage with only very slight external bleed-

1. See Rotunda Hospital Reports in Dublin Journal of Medical Science. Years 1899 - 1907.
2. Clinical Reports. 1905 - 1907.
3. See page 69.

ing, (classed as mixed) delivery was rapidly completed with forceps and the patient succumbed shortly afterwards from the effects of shock. The second was a concealed haemorrhage of severe type, delivery was effected with forceps, and death took place five hours after from convulsions. The third was a severe external haemorrhage complicated with albuminuria. In the fourth the haemorrhage was largely concealed, the patient was pulseless when first seen, rallied somewhat after treatment, but died suddenly after attempting to sit up in bed against orders.

The vagina was plugged in 18 cases 9 of which ended fatally. In 7 cases the haemorrhage was external, in 11 it was mixed. In no case was it completely concealed. Spontaneous delivery occurred in 9 cases, in 8 delivery was effected by artificial means, and in 2 death occurred before delivery was completed.

To be perfectly fair one should perhaps not include in this comparison those cases which have been taken from hospital reports and which are simply recorded as fatal cases. Even then, however, we are left with a total of 14 cases in which plugging was employed 5 of which were fatal, making a percentage mortality of 35.7 % as against 16 % for rupture of the membranes.

The Dublin School has certainly brought forward an alternative method of treating cases of external and mixed haemorrhage. The results they show are good, but, as the above facts appear to me to show, they are certainly no better, are, in fact, not so good as those obtainable by the older and simpler method. And, further, they do not offer a solution to that most difficult problem of all - the treatment of bad cases of concealed haemorrhage, which, after all, is the subject on which most doubt exists and on which it is

most difficult to dogmatise.

The question as to the best means of effecting delivery need not detain us long. It is largely a question of circumstances, and must be faced, as such, in each individual case. Wherever it is possible, and when the haemorrhage appears to have been checked delivery should be left to the natural powers and should not be unduly hastened. *Accouchement forcé*, by which is meant rapid and forcible dilatation of the cervix, followed by immediate delivery by means of forceps or version, has been proved again and again to be unsuitable and highly dangerous. Failing the natural powers we have three alternatives, forceps, version, and various more or less elaborate operations, having for their object delivery of the child otherwise than *per vias naturae*.

The following table shows the method in which delivery was effected in 76 cases in my series.

Method of delivery	No: of Cases	Deaths
Spontaneous . . . .	45	9
Forceps . . . . .	13	5
Version . . . . .	14	11
Caesarian Section . . . .	1	0
Vaginal Caes. Sect. . . . .	1	
Pore's operation . . . . .	1	
Kristell <sup>er's</sup> method . . . . .	1	0

It will be seen that in more than half the cases nature was able to effect delivery, though, owing to the fact that many of these were severe, the death-rate is certainly high. The excessively high

mortality attaching to version gives an exaggerated idea of the danger of that operation, until we realise that all the cases in which it was employed were of the worst type, and that it was often only undertaken when other means had been tried and failed. In one case (49) the patient was already moribund when version was resorted to, and in several it was performed when the patient was markedly collapsed from long continued haemorrhage. The advantages of version over forceps are that it does not require so great a degree of cervical dilatation for its performance, and, that a leg having been brought down, the half breech will form an efficient dilator and delivery need not be hastened. As Goodell<sup>1</sup> however pointed out, in cases of concealed haemorrhage, when there is bulging of the membranes or placenta into the uterine cavity, the ledge thus formed will often render version difficult, and necessitate the introduction of the hand into the uterus. The shock produced by such a procedure will necessarily be very great, and may be sufficient to turn the scale against the patient and precipitate a fatal result. Wherever the passages will allow it, therefore, forceps are to be preferred to version as a means of effecting delivery.

In one case Kristellers' method of compressing the uterus and forcing out its contents was employed successfully. The method however does not appeal to me as being a safe one, taking into account the friable state of the uterus, and should not be recommended as a routine procedure.

Of the various measures coming under the head of surgical operations that of Poro is probably the best when circumstances

1. Op. cit. p.346.

permit, though the number of cases in which life can be saved by these means is probably limited. In Hospital, and under suitable circumstances, hysterectomy offers certain advantages, especially in cases of concealed haemorrhage, when the cervix is undilatable. In my series this operation was resorted to in one case and Caesarean section in another, in neither of which, probably, would the patient's life have been saved by any other means.<sup>1</sup>

In all cases of accidental haemorrhage the general treatment of the patient should claim the attention of the physician from the first. Not only is it of the utmost importance to guard against shock in the early stages of labour, and to treat it when it arises, but it is equally important to fortify the patient against the occurrence of this dangerous complication after the labour has ended. Chief among the means to be adopted to this end must rank the infusion of normal saline solution into the veins, into the cellular tissue or into the rectum. The method most generally useful is that of intracellular infusion. The operation is extremely simple and can be quickly performed. The apparatus required is readily sterilisable, and takes up little room in the midwifery bag. The part generally selected for the injection is the loose cellular tissue beneath the breast or in the axilla, and though several pints of fluid may, and often should be infused, more than one pint should not be thrown into any one spot. I have seen a case in which the injuries to the tissues caused by too copious an injection resulted in a large slough being formed, and I know of another in which the whole breast sloughed from a similar cause. Rectal saline injections I believe to be of little value

1. See table, p. 76 .

except in mild cases. The patient's strength should be supported with liquid nourishment, given in small quantities at frequent intervals, or by means of nutrient enemata. Stimulants in the shape of hypodermic injections of strychnia, ether, and digitalis should be administered as occasion arises, and in all cases where the haemorrhage is at all severe the foot of the bed should be raised on two chairs or the limbs bandaged.

The third stage of labour requires most careful management, and everything should be done to guard against the occurrence of postpartum haemorrhage. If this arises it should be treated in the usual way, the uterus being firmly packed with iodoform gauze.

APPENDIX.Cases attended by the Author.

Case 1. A. B., aged 33 years, in her 7th pregnancy was suddenly attacked with severe abdominal pain and faintness at term. Patient was a rather stout anaemic woman, of the working class, had had several illnesses and was known to have made several ineffectual attempts to procure abortion in the early months of her pregnancy. Beyond these facts I could obtain no history of her former life, nor any hint as to the cause of the present illness. When summoned by the district midwife some hours after the first onset of the symptoms, I found her deathly pale, with soft, rapid pulse, yawning and throwing her arms about, and moaning with pain. The abdomen was distended, was uniformly hard and very tender. There were no labour pains. The foetal parts could not be felt, nor the heart sounds detected. The os admitted two fingers, the membranes were intact and the head presenting. There was a slight discharge of blood-stained serum from the vagina. Concealed accidental haemorrhage was diagnosed and an attempt was made to rally the patient by means of copious rectal saline injections. A tight binder was applied over the abdomen. Half an hour later the membranes were punctured, version performed, and a leg brought down. The cervix dilated readily, the uterus from which a large quantity of blood and clots was expelled, contracted well and delivery of a dead foetus was accomplished with very little difficulty. The placenta was expelled naturally and retraction appeared to be satisfactory. The patient however remained collapsed. Strychnine and ergot were

injected hypodermically, and more saline fluid thrown into the rectum. In spite of this the uterus became flaccid, filled with blood, and, before anything further could be done, the patient died within half an hour of delivery. It is a matter of great regret that no histological examination was made of the placenta, nor was it possible to obtain a postmortem in this case.

Case 2. H. L., aged 34 years, 9th pregnancy, one of which had ended in a miscarriage. Period of gestation 7th month. Previous labours had been easy, and pregnancies had followed one another in quick succession, the longest interval being two years and five months. Menstruation began at 16, had always been regular, of the 28 day type, lasting from four to five days with moderate loss. Had always been healthy, but had suffered considerable domestic worry during her recent pregnancy, which, she says, had affected her health. On the day before the onset of the symptoms she had been engaged in washing, and had turned the "wringer." At ten o'clock on the morning after she was alarmed by a sudden profuse loss of blood, which "poured from her when she moved, and turned "her faint". She sent for the midwife, and I was called to see her about one o'clock. She then presented all the symptoms of profound collapse. Her face was pale and her expression anxious. Her skin was cold and clammy, her pulse soft compressible and rapid, and her respirations sighing. She had had no labour pains, but complained of severe colicky pains in the abdomen. Her uterus was tense, distended and very tender. The foetus could not be felt, nor its heart sounds heard through the abdominal walls. Beyond a slight brownish discharge from the vagina all external haemorrhage

had ceased. The os admitted two fingers, the head could be felt through the membranes, and, as far as could be reached with the finger, no placenta could be discovered.

Diagnosing accidental haemorrhage I ruptured the membranes, gave a dose of six grains of quinine, and applied an abdominal binder as tightly as possible. The head filled the brim, and, at first, only a small amount of clear liquor amnii (the "fore waters") escaped. On pushing up the head however, a considerable gush of blood and amniotic fluid occurred, the escape of which was easily regulated by allowing the head to fall back into the brim. Uterine action began within half an hour, though the patient's condition remained bad, her pulse being at times almost imperceptible. A pint of normal saline solution was infused beneath the right breast and was followed by decided improvement. Sufficient dilatation of the cervix was easily effected by the fingers, forceps were applied and a dead child delivered about four o'clock in the afternoon. After delivery of the placenta, which separated naturally, and was accompanied by a quantity of clots, a hypodermic injection of Xm. of Ernutin and  $1/60$ .gr. Strychnine was given. There was no post-partum haemorrhage, and, except for the anaemia, which resulted from the severe loss of blood, the patient made a good recovery. The placenta presented the appearance common in these cases, the maternal surface being covered with clots, though there was no excavation of the surface as was seen in the next case.

Case 3. N. R., aged 33, 3rd pregnancy. The first ended at the 7th month, the child only living for four hours. Her second labour was very long and was ended with instruments. During her recent

pregnancy she had had a severe haemorrhage at the sixth month. Menstruation began at 19, is regular, of the 28 day type lasting usually two days. On the day before she was attacked she, like the last patient, had been occupied with her washing and had turned the wringer. Thinks that she strained herself by so doing.

Bleeding began in the morning, and continued, more or less, all day, especially when she moved about. The midwife was sent for about 6.30, and I was summoned by her shortly afterwards. On my arrival the patient was collapsed, though not seriously so, and the bleeding was still going on pretty freely. There was no excessive enlargement or tenderness of the uterus; the foetus could be felt presenting by the head, with its back to the left side of the mother's abdomen. No heart sounds could be heard. There were no labour pains. The os admitted two fingers; the head was engaged in the first position, and no placenta could be felt within reach of the fingers. The membranes were intact, and there was a good deal of clotted blood in the vagina. This was cleared out, the membranes ruptured, ten grains of quinine given and a tight binder applied. The effect of this was immediately to stop the haemorrhage, which did not recur, and, strong pains beginning in about an hour, the case was left to nature, and a small dead child delivered about midnight. The third stage and the puerperium were normal and the patient made a good recovery.

The placenta in this case possessed a very characteristic appearance and one that has been often described. To the maternal surface a considerable amount of dark clot was adherent, on removal of which a depression, roughly circular in shape and measuring about

three inches in diameter, was left. The base of this depressed area was covered with shreds of dirty yellow fibrinous material; and on section, in the placental substance were several large solid areas having the appearance of infarcts. Microscopically these were seen to be composed largely of blood clot and fibrin, in the meshes of which a few compressed chorionic villi could be made out. The foetal surface presented no abnormality.

Case 4. G. R., aged 29. Fourth labour. Previous health good, and labours easy. No miscarriages. Whilst engaged in making her bed was alarmed to find that she was bleeding. States that on the previous evening her husband had come home the worse for drink, had had forcible connection with her and caused her pain.

When I saw her, shortly after the onset of the symptoms, she was bleeding, though not to any alarming extent; she was frightened but not collapsed. There was no distension or tenderness of the abdomen, the foetal heart sounds were heard, and a left-occipito-anterior position made out. The os was about an inch in diameter, and there were no pains. The membranes were punctured and 10 grs. of quinine given. The bleeding immediately ceased, pains began shortly, and a living female child was delivered naturally the same evening. There was a flat dark coloured clot adherent to the under surface of the placenta which otherwise appeared healthy.

TABLE OF EIGHTY-FOUR CASES OF ACCIDENTAL HAEMORRHAGE.

1. Cases of External Haemorrhage

No.	Reference	Age	Sex	Period of Gestn:	Presenta- tion.	Cause	Treatment	Result		Time & Cause of Death.
								M	Ch	
1	St: Thomas's Hospital Reports. 1899, p.384.	36	6	-	-	-	Rupture of Membranes.	D	-	3 hrs after. P. P. H.
2	Gant, Lond: Obst: Trans: vi, 214	35	6	8½ mon	Vertex	-	None stated	D	D	Undelivered
3	Muir, Ibid: xxxv, 338	-	-	7½ mon	-	-	Induction of labour	R	L	-
4	Greenhalgh. Ibid: viii, 288.	30 40	M	end of 8th mo:	-	Exertion	Tight binder Stimulants Transfusion	D	D	Undelivered.
5	City of London Lying-in Hosp. Repts. 1890	30	7	-	-	-	Version. Rapid deliv:	D	D	Syncope ¼ hr after
6	Ibid: 1897	38	8	-	-	-	Version	D	D	Never rallied within 6 hrs
7	Ross, Scott. Med: & Surg: Jour: 1903. p. 412.	21	2	Near term	Vertex	-	Rupt. Memb. Binder. Version Craniotomy after- <del>crushing</del> <sup>crushing</sup> head.	R	D	-
8	Nichols. Bost M. & S. Jour. 1880. ciii, 59	38	6	Term	Transverse	-	Plug. Spontan: Version.	R	D	-

No.	Reference	Age	Labs	Period of Gestn:	Presenta- tion.	Cause	Treatment	Result		Time & Cause of Death.
								M	Ch	
9	Ballantyne. Edin. M. J. 44 1890. i, p.1006		1	Near term	L. O. A.	Anomaly of mem- branes.	Expectant	R	Born alive	-
10	Swayne. Bristol M. & Ch. J. vii.		M	8 mon	Footling	-	Plug. Ergot. Later Rupt. Membranes	R	D	-
11	-do-		M	7 mon	Head and hand	Fright	Plug. Opium. Astringents. Rupt. membranes	R	D	-
12	-do-		M	7 mon	Vertex	Pertus- sis	Opiate. Spontan: Delivery.	R	D	-
13	-do-		1	Near term	Vertex	Long walk	Opium. <del>Perceps</del> . Binder. Rupt. membranes	R	D	-
14	-do-		6	8 mon	Footling	Intem- perance	Cold applic. Plug. Ruptured membranes	D	D	1 hour after.
15	-do-		2	-	Vertex	-	Ergot. <del>Perceps</del> . Barnes bag. Rupt. membranes	R	D	-
16	-do-		4	8 mon	Vertex	Long walk	Ruptured mem- branes	R	D	-
17	-do-		3	-	Vertex	-	None required	D	D	Septicaemia 34 days aft:
18	-do-		3	-	Vertex	-	Ergot. Ruptured membranes	R	D	-

No.	Reference	Age	Labors	Period of Gestn:	Presenta- tion.	Cause	Treatment	Result		Time & Cause of Death.
								M	Ch	
19	Swayne. Bristol M. & Ch. J. vii.		1	-	Vertex	Albumin- uria.	Rupt. membranes Version.	D	D	Undelivered
20	-do-	19	1	-		Coitus	None required	R	L	-
21	Marsh. N. Y. Med. J. 1892. lvi, 323.	18	1	Term	L. O. A.		Plug. Barnes bag. CHCl <sub>3</sub> . Forceps.	R	D	-
22	-do-	20	1	Term	L. O. A.	Syphilis	Ruptured mem- branes & plug.	R	D	-
23	-do-	-	5	-	L. O. A.	Blow on abdomen	None required	R	D	-
24	Robinson. N.Y. Med. Rec. 1905. lxxvii, 657.	30	2	8½ mon	L. O. A.	Working sewing machine	None required	R	L	-
25	Tweedy. Dub. J. Med. Sci. 1905. cxix, 407	29	6	-	Vertex	-	Rotunda plug. Version	D	D	Died while being delivered.
26	Queen Charlotte's Hospital Reports. 1905.	35	10	7 mon	Transverse	-	Cervix dilated with bag. Internal version.	D	D	18 hours after. Shock.
27	Desprez. Arch. de Tocol. et de Gynec. 1892. xix, 15.	38	11	8 mon	Vertex	Relatively short cord.	No special treatment	R	D	-
28	Lloyd. Lancet. 1906. i, 156.	35	M	Near term	-	Nephritis	Spontaneous delivery	D	D	11 days after, Uraemia.

No.	Reference	Age	Labors	Period of Gestn:	Presenta- tion.	Cause	Treatment	Result		Time & Cause of Death.
								M	Ch	
29	Barbour. Scott. M. & S. Jour. 1897. i, 489.	-	-	6 mon	-	Fall while skating	Membranes ruptured.	R	D	-
30	Holmes. Amer. J. of Obst. 1901. xliiv, 759	-	9	Term	R. O. P.	-	None	R	L	-
31	Author	33	3	-	L. O. A.	Washing	Membranes ruptd: Binder. Quinine.	R	D	-
32	-do-	29	4	-	L. O. A.	Coitus.	Membranes ruptd: Quinine.	R	L	-
33	Jardine. Glasgow Med. Jour. 1892. xxxvii, p. 417.	37	6	7 mon	-	Coughing Syphilis	Ergot.	R	D	-
34	Lowry. Med. News. Philadelphia. 1893. lxiiv, 159.	28	4	Term	-	-	Ergot.	R	L	-
<u>II. Cases of Mixed Haemorrhage.</u>										
35	Inglis. Lancet. 1906. ii, 1539.	40	M	Term	Vertex.	Exertion	Membranes ruptd: Digit. dilat: Forceps.	D	D	No p.p.h., but died soon after.
36	De Lee. Am. J. Obst. 1901. xliiv, 785	35	5	7 mon	L. O. A.	Endometritis. Haemophilia.	Bag. Ergot. Craniotomy. Version.	D	D	Haemophilia. Constant oozing.
37	St. Thomas's Hospital Rep. 1898, 263.	29	5	-	Vertex	-	Bag. Ergot. Forceps	D	D	1 hr after. collapsed.

No.	Reference	Age	Labors	Period of Gestn:	Presenta- tion.	Cause	Treatment	Result		Time & Cause of Death.
								M	Ch	
38	Dunn. Lond. Obst. Trans. viii, 285.	39	8	8 mon	Vertex	Severe Coughing	Ergot. Stimulants.	D	D	Undelivered.
39	Brunton. Ibid. viii, 288.	-	-	-	Vertex	Slip on stairs.	Ruptured mem- branes	-	D	-
40	Mitchell. Ibid. viii, 282.	40	9	9 mon	Vertex	-	Ergot.	D	D	Soon after, though uterus contracted well.
41	Queen Charlotte's Reps. 1907.	29	6	-	Vertex	Pregnancy Kidney	Plug, Binder & Pad. Podalic version.	D	D	Very little bleeding aft: delivery.
42	Jardine. Scott. M. & S. J. 1899. 511.	-	M	7 mon	-	Straining at stool.	Membranes ruptured Forceps.	R	D	-
43	-do-	41	M	-	Vertex	Washing	Bag. Digital dila- tation. Version.	D	D	No p.p.h. Died in ½hr.
44	-do-	27	2	7½ mon	Vertex	Bursting of De Ribes' bag.	Version	D	L	p.p.h. from torn cervix.
45	Ross. Ibid. 1903. 412.	23	3	8 mon	-	-	Membranes ruptured followed by syn- cope and distension of uterus.	R	D	-
46	Larking. B.M.J. 1900. 76.	33	7	7½ mon	Vertex	-	Membranes ruptured Bag (burst). Forceps.	R	D	-

No.	Reference	Age	Labor	Period of Gestn:	Presenta- tion.	Cause	Treatment	Result		Time & Cause of Death.
								M	Ch	
47	Targett. L. Obst. Trans. xlvii, 147.	34	8	6 mon	-	Albumin- uria.	Ruptured membranes Plug. Hysterectomy	R	D	-
48	Marsh. N.Y. Med. Jour., 1892. lvi, 323.	29	1	8 mon	Vertex	Albumin- uria.	Plug. (became blanched). Forceps	R	D	-
49	Maygrier. Bull. Soc. d'Obst. 1892. p.162.	34	4	8 mon	Vertex	-	Plug. Binder. Stimulants. All failed.	D	D	Undelivered.
50	Tomkinson. <i>Brit. M. J.</i> 1904 <i>i</i> , p. 536.	34	-	8 mon	Transverse. Twins.	Fall from car	1st foetus - ver- sion.	R	L D	-
51	Dubrisay. Bull. Soc. d'Obst. 1903. vi. 263.	42	8	5 mon	-	Albumin- uria. Heart disease.	None.	R	D	-
52	Guerin Valmañ. Ibid.	29	4	8 mon	-	Albumin- uria.	Expectant.	R	D	-
53	Oldham. Guy's Hosp. Reps. 1856. ii. 94.	40	4	7½ mon	Vertex	-	Membranes ruptured Binder. Ergot.	R	D	-
54	Kingsford. Guy's Hosp. Reps. 1856. p.96.	40	10	-	Vertex	-	Rupt: of membranes. Ergot, opium, etc.	D	D	Undelivered.
55	Gaston. Ann. de Gynec. 1906. iii, 682.	27	1	7 mon	-	Albumin- uria.	Rupt: of membranes. Chloral.	R	D	-
56	-do-	21	1	6 mon	Vertex	Albumin- uria.	Expectancy. Late rupture.	R	D	-
57	-do-	-	M	6½ mon	Vertex	Albumin- uria.	Plug. Cervical in- cisions. Vag. Caes. section.	R	D	-

No.	Reference	Age	Labor	Period of Gestn:	Presenta- tion.	Cause.	Treatment.	Result		Time & Cause of Death.
								M	Ch	
58	Lop. Bull. de la Soc. d'Obst. 1903. vi.	28	3	4 $\frac{2}{3}$ mon	Breech	Endome- tritis.	Rest. Stimulants. Induction of labour.	R	D	-
59	Tweedy. Dub. J. Med. Sci. 1907. Vol. 1. 124, p. 84.	40	7	Term	-	-	Rotunda plug. Spontaneous delivery.	D	D	No p.p.h. Died within 2 hours.
60	-do-	35	2	8 mon	-	Struggle when drunk.	Plugged twice. Spontaneous delivery.	D	D	Slight p.p.h. Died 1 hour after.
61	Holmes. Amer. Jour. Obst 1900. xlv. 759.	25	2	8 mon	L. O. P.	Endome- tritis.	Plug. De Ribes' bag (burst). Forceps.	D	D	P. p. h. Shock 1 hr. after.
62	Author.	34	8	7 mon	Vertex	Turning mangle	Rupt. of membranes. Binder. Quinine. Forceps.	R	D	-
63	Dakin. Obst. Trans. xxxvi, 315.	-	8	7 $\frac{1}{2}$ mon	-	Shock (mental)	No treatment.	R	D	-
64	Bligh. Lancet. 1895. ii, 91.	43	13	8 mon	Vertex	-do-	Rupt: membranes. Digital dilatation.	R	D	-
65	Jardine. Glasgow Med. Jour. xxxvii, 417.	-	3	8 mon	L. O. A.	-	CHCl <sub>3</sub> . Forceps.	D	D	Collapsed after deliv: No p.p.h.
66	-do-	30	1	8 mon	-	Washing day be- fore.	CHCl <sub>3</sub> . Forceps. Dig: dilatation.	D	D	-do-

No.	Reference	Age	Labrs	Period of Gestn:	Presenta- tion.	Cause.	Treatment	Result		Time & Cause of Death.
								M	Ch	
67	Jardine. Glasgow Med. Jour. xxxvii, 417.	28	8	8 mon	Breech	<del>Badly treated.</del> Traumatism.	Rupt: membranes.	R	D	-
68	-do-	32	8	8 mon	L. O. A.	Mental shock.	CHCl <sub>3</sub> . Barnes bag. Version.	R	-	-
69	-do-	41	12	7 mon	L. O. A.	Kick.	Barnes bag and rupt: membranes.	R	D	-
70	Blackwood. Edin. Med. J. xli, 336.	24	2	Term	L. O. A.	-	Long expectancy. Forceps.	R	D	-
71	Greene. Med. News. Philadelphia. ix. 18.	-	M	9 mon	-	Slip on ice.	Kristeller's method of expression.	R	D	-
72	Keyworth. Proc. Roy. Soc. Med. Obst. Sect. Vol. ii, p. 107.	34	8	9½ mon	-	-	Plugged and re-plugged. Ergot.	D	D	See p.

III. Cases of Concealed Haemorrhage.

73	Le Lurier. Ann. de Gynec. 1906. iii.	26	3	8½ mon	Vertex	-	Caesarian section.	R	D	-
74	Anning. Lancet. i, '04 p. 368.	35	8	7 mon	Vertex	-	Late rupt: of membranes. CHCl <sub>3</sub> . Forceps.	R	D	-
75	Jardine. J. Obst. and Gynec. Brit. Emp. 1904 vi, 446.	45	10	Term	Vertex	-	Stimulants. Saline infusion. Waited.	D	D	3 days later. Pernicious anaemia.

No.	Reference	Age	Labrs.	Period of Gestn:	Presenta- tion.	Cause	Treatment	Result		Time & Cause of Death.
								M	Ch	
76	City of London Lying-in Hosp. Rep. 1891.	41	8	-	-	-	Induction of labour (method not stated)	D	D	Never rallied. Within 6 hrs.
77	Larking. B.M.J. 1900. 76.	33	7	Term	Vertex	-	Quinine. Ergot. Bag (burst). Forceps.	R	D	-
78	Tuttle. Bost.M.& S.J. cxxxii, 35.	30	4	4 mon	-	-	Evacuation of uterus.	R	D	-
79	McGrew. Am.J.Obst. xxx, 374.	18	1	8 mon	Breech	Albumin- uria.	Morphia. No special treatment.	R	L	-
80	Weatherley. B.M.J. 1878. ii, 284.	34	-	-	Vertex	Albumin- uria.	Digital dilatation Version.	D	D	-
81	Kingsford. Op.cit.	38	-	8-9 mon.	Vertex	Drunken bout.	None. Not diagnosed	D	D	Undelivered.
82	Gaston. Op.cit.	42	M	7 mon	-	Albumin- uria.	Expectancy.	R	D	-
83	Author	33	7	Term	Vertex	-	Version. Rectal saline etc.	D	D	Postpartum haemorrhage.
84	Hellier. Lancet. 1892. i, 1237.	39	10	Term	Vertex	-	Ergot. Rupt: membranes.	R	D	-