

# The Journal of Obstetrics and Gynæcology of the British Empire

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VOL. XIX.

JANUARY, 1911.

No. 1.

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## On Cæsarean Section in the United Kingdom.\*

WITH

Tables of 1282 Cases of Cæsarean Section by over 100  
Obstetricians and Gynæcologists of the United  
Kingdom, who were living on June 1, 1910.

BY

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In this paper I have added somewhat to the Report read at St. Petersburg, for it is evident that some details which would be out of place in an International Report might prove interesting to those more closely concerned.

I would like here cordially to thank my colleagues, over 100 of whom have sent in their cases of Cæsarean section, for their replies to my numerous questions, and for helping me to make a list of 1282 cases, the study of which cannot fail to be useful and interesting.

The subject of Cæsarean Section is a fascinating one. The operation has been known and practised in isolated cases in many parts of the world—civilized and uncivilized—for centuries, but till the last 30 or 40 years had been mainly employed to prevent women from dying undelivered when obstruction was due to extreme pelvic contraction or to the presence of a pelvic tumour. During recent years the comparative safety of the operation has led to wide extension of its indications, which may be enumerated as follows:—

### A. *Obstructions to labour.*

1. Pelvic contractions. Induction of Premature Labour. Craniotomy. Symphysiotomy and Pubiotomy. Cæsarean Section. C.S. in Septic cases. Sterilization. Extra-peritoneal Cæsarean Section. Summary.

\* Being a Report read at the V-me Congrès International d'Obstetrique et de Gynécologie at St. Petersburg in September, 1910.

2. Fibro-myomata.
3. Cancer of cervix or vagina.
4. Ovarian tumours.
5. Other pelvic tumours (osteomata, enchondromata, cancer of rectum, etc., subperitoneal tumours). Hydatids. Bicornute uterus.
6. Stenosis of cervix or vagina.
7. Miscellaneous. (Previous ventrifixation. Tonic contraction of the uterus. Hour-glass contraction. Prolonged gestation).

B. *Uterine Hæmorrhage.*

1. Concealed accidental Hæmorrhage.
2. Placenta Prævia.

C. *Constitutional Crises.*

1. Eclampsia.
2. Miscellaneous. (Chorea. Advanced Heart Disease. Obesity and anasarca, etc. Myasthenia gravis).

The subject will be dealt with under each of these indications, and will conclude with some remarks upon vaginal Cæsarean Section and some statistics derived from the tables of 1,282 cases of abdominal Cæsarean Section. These cases are appended in chronological tables.

A. I. CONTRACTED PELVIS.

In 1826 Professor Hamilton, of Edinburgh, described four methods of delivery in contracted pelvis:—

1. Induction of Premature labour when seen before full time.
2. "Lessening the size of the child's head" which he called "embryotomy."
3. "Cutting through the parietes into the uterus," which he called "hysterotomy or Cæsarean Section."
4. "Dividing the bones of the pelvis at the Symphysis Pubis," an operation then called the "Sigaultian Operation."

The induction of premature labour was only applicable to cases seen during pregnancy and discovered then to have a moderately contracted pelvis, and before the introduction of antiseptics the induction was not without risk. The mortality of Cæsarean Section in the United Kingdom, then looked upon as a forlorn hope, was 95 per cent., only 1 case, according to Blundell,<sup>2</sup> having survived out of 23 cases up to 1821, and the Sigaultian operation was entirely discountenanced. Practically, therefore, the only real chance of delivery with moderate pelvic contraction was craniotomy, which had a mortality of at least 20 per cent. (Churchill),<sup>3</sup> whilst patients with a conjugata vera of less than 2½ in. (6.2 cm.) had only a 5 per cent. chance of survival.

In the present day for all practical purposes these four operations, improved and extended as regards technique, facilitated by anæsthesia and rendered safer by asepsis, are still the only means at our disposal.

It is necessary to discuss first the three alternative methods for dealing with cases of contracted pelvis:—Induction of Premature Labour, Craniotomy, and Pelviotomy before discussing Cæsarean Section.

#### *Induction of Premature Labour.*

This is essentially a British procedure and was established as ethically correct in the treatment of contracted pelvis at a consultation of London Obstetricians in 1756, and the first case came under the care of Dr. Macauley who induced labour by rupturing the membranes, the woman recovering.

It was not till 1809 that it was adopted in Germany by Wenzel, and in 1831 in France by Stoltz.

In 1862 Robert Barnes stated that "English Midwifery, pre-eminently conservative, claims the honour of introducing and establishing an operation which has probably been the means of saving more lives of mothers and children than any other operation we know of." This method of dealing with pregnancy in cases of contracted pelvis is now a favourite one in the United Kingdom when the case is seen early enough, as an alternative to any other method when the conjugata vera is over  $3\frac{1}{4}$  inches (8.1 cm.) in a flat, and  $3\frac{1}{2}$  (8.7 cm.) in a generally contracted pelvis, or where in previous labours the child or the child's head was found to be relatively too large for the pelvis.

I know of only one British obstetrician (Dr. Hastings Tweedy)<sup>6</sup> who takes the view, held also by Pinard and Whitridge Williams, and others abroad, that induction of premature labour is never advisable. He considers that "Induction of premature labour, prophylactic turning, high forceps and perforation are obsolete procedures."

The advantages of induction of premature labour are its *ease* of performance, its *safety* to the mother, the mortality and morbidity being practically nil; and, if done at or after the 35th week, with the vertex presenting, the small fœtal mortality.

*Ease.* The simplicity of Krause's<sup>6</sup> method (1855) of inducing labour by the introduction of one or two sterilized No. 12 gum elastic bougies between the membranes makes the proceeding easy.

*Safety.* (a) *The maternal mortality* is less than 1 in 200. *The fœtal mortality* is extremely small after the 35th week, especially if delivery of the child is able to be spontaneously accomplished, the head being encouraged to enter the brim by Walcher's position, and if labour be only induced when the head presents. In this connexion

it may be mentioned that the foetal head is very compressible at this stage, allowing extensive moulding.

If the head does not present, and cannot be made to engage in the brim by external cephalic version, labour should not be induced, but the case allowed to go to full term with the consent of the patient, and be dealt with by Cæsarean Section.

In transverse or breech presentations, or after podalic version, the immature child will very probably die during or soon after delivery as a result of the manipulations required.

Thus at Queen Charlotte's Hospital between 1890 and 1899, Dr. J. B. Banister<sup>14a</sup> tells me that podalic version was resorted to as a means of delivery or the child presented by the breech after induction of labour in 22 cases of contracted pelvis, and out of these there were 17 foetal deaths during or within 3 days of delivery, giving a foetal mortality of 77·2 per cent.

In the next ten years, 1899 to 1909, 27 cases either of breech presentation or of podalic version to effect delivery were met with. In these 27 cases the child perished in 11, thus giving a foetal mortality of 40·7 per cent. This diminished mortality is due to a narrowing of the indications under which version was attempted, and to the generally later date at which induction was performed in this decade.

This mortality is 15·8 per cent. higher than the mortality under identical circumstances attending delivery per vias naturales with cephalic lies during the same period.

According to Bar<sup>7</sup> the foetal mortality after induction of labour in pelvises with a conjugata vera of  $2\frac{3}{4}$  in. to  $3\frac{1}{4}$  in. (7·8 cm.) is 53 per cent., whilst with a conjugata vera of  $3\frac{1}{8}$  to  $3\frac{3}{8}$  in. (8·9 cm.) the mortality is 12 per cent. and 8·6 per cent. where the diameter is over that size. In practice, however, the relation of the size of the head to the size of the pelvis is far more important than the pelvic measurements even when ascertained by such instruments as Skutsch's pelvimeter. As Barbour concisely states "the foetal head is the best pelvimeter," and probably the best method of arriving at the exact date when labour should be induced is by Müller's<sup>8</sup> (1885) manœuvre associated with the modification suggested by Munro-Kerr of applying the thumb of the hand which is examining *per vaginam* to the top of the symphysis pubis to estimate the amount of overlapping of the head. Griffith<sup>10</sup> adopts a somewhat different method. The patient is placed in an armchair in such a position that the uterus is vertical. The difference in weight of the foetus (a few ounces) and the liquor amnii is sufficient to cause the head to descend into the brim. So long as this happens induction is unnecessary, but when the head can no longer enter the brim induction should be performed.

In multiparæ the history of previous confinements, the weight

of the children and the size and shape and bone development of their heads at birth are further indications of value.

Eden<sup>11</sup> gives the statistics of induction of premature labour at Queen Charlotte's Hospital, and states "that out of 309 cases of pelvic contraction during the four years 1905—1908, 101 had had premature labour induced by Krause's method at a date of gestation which was found by Müller's manœuvre to be indicated. The maternal mortality was *nil*, and the foetal was 13 per cent. In 84 cases labour had been induced at or after the 36th week. The average weight of the infants was from 5 to 5½ lb."

Treub of Amsterdam<sup>12a</sup> induced labour prematurely in 36 women, 2 of which had a conjugata vera of 8·8·5 cm., 13 between 8·5 and 9 cm., 14 between 9 and 9·5 cm., and 7 between 9·5 and 10 cm. The previous experience of these 36 women was 49 dead children, and 38 living (43·6 per cent.). As a result of the induction of labour these same women had 14 dead children and 49 living (77·7 per cent), the children only being considered living if they left the hospital with their mothers.

At a recent discussion Spencer<sup>12</sup> states that "he has induced labour in 33 cases of contracted pelvis in the last 5 years at University College Hospital with 4 foetal deaths (12 per cent.). He has induced labour in a woman six times, and she has, as a result, five healthy living children. In a patient who recently left the hospital the first pregnancy was terminated by craniotomy; the other three labours had been induced. In the last of these he discovered twins, and therefore postponed induction to the 37th week. This patient had as a consequence of these three inductions four living children. Next week he would induce labour in a lady with a 3½ inch conjugate, who had two of the healthiest children he ever saw, both induced at the 35th week." He (Spencer) rightly regarded individual cases of this kind as of more importance in deciding the real value of induction of premature labour than any amount of statistics in which this important information was not forthcoming.

Where the C.V. is *over* 3·5 inches (8·7 cm.) in flat pelvises or 3·8 inches (9·5 cm.) in generally-contracted pelvises spontaneous or forceps delivery may be reasonably expected at full term if time be given for moulding of the foetal head and the head be of normal size.

It is also equally desirable that spontaneous delivery should be encouraged to take place after induction of premature labour. Thus Banister<sup>14a</sup> states that at Charing Cross Hospital and at Queen Charlotte's, 1906 to 1909, the foetal mortality up to the end of the first month, in 99 cases of spontaneous delivery after induction of labour in pelvises of 3½ inches and over, was 5, *i.e.*, 5·05 per cent., as compared with a mortality of 10 in 28 similar cases, 35·7 per cent.,

where forceps (21 cases) or version (7 cases) had to be subsequently adopted.

Prof. von Herff<sup>11a</sup> of Basle, in a communication to the Meeting of the British Medical Association held in London in 1910, spoke strongly in favour of the induction of premature labour by all accoucheurs who estimated the life of the mother higher than that of the child, and states that at his own Clinic spontaneous delivery occurred in 86.5 per cent. of his cases of contracted pelvis after induction of labour.

To sum up it may therefore be stated that if the conjugata vera be less than  $3\frac{1}{4}$  inches (8.1 cm.) the patient should be allowed to go to full term and have Cæsarean Section performed. If the C.V. be over  $3\frac{1}{4}$  inches (8.1 cm.) and the head present labour may be induced at the 35th week; if the C.V. be  $3\frac{1}{2}$  inches (8.7 cm.), at the 36th week. Delivery after induction should be encouraged to take place spontaneously whenever possible.

### *Craniotomy.*

Craniotomy has never been a favourite operation in the United Kingdom, but owing to the terrible mortality of Cæsarean Section up to 30 years ago (89 per cent. in 1866 and 84 per cent. up to 1876) and to the absolute disapproval of Sigault's original symphysiotomy (1777 to 1858) there was no other method of dealing with contracted pelves when the patients were seen for the first time during labour, and as a matter of fact Churchill,<sup>3</sup> who wrote in 1842, said that craniotomy "was the only safe operation in cases of moderately contracted pelves and had been performed:—

In the United Kingdom 218 times in 47,851 cases (1 in 219).

In France 30 times in 36,169 cases (1 in 1,205).

In Germany 132 times in 256,655 cases (1 in 1,944).

Taking all these cases together the maternal mortality was 20 per cent. whilst the mortality of Cæsarean Section in the three countries was at least 60 per cent. and in the United Kingdom over 80 per cent."

Obstetricians, however, viewed the destruction of the child with keen dislike, and in 1859 the first paper read at the newly-formed Obstetrical Society of London was by Dr. Tyler Smith<sup>13</sup> (Physician-Accoucheur at St. Mary's Hospital, London) on "Abolition of Craniotomy in all cases where the foetus is living and viable." Tyler-Smith stated that "the maternal mortality of the operation was still about 20 per cent." It was realised, however, then and now, that it may be necessary in the interests of the mother to destroy the child especially in cases known or thought to be septic in order to save the mother, in preference to performing pelviotomy or Cæsarean section. In such cases, as Galabin said in 1902, "the

perforation of a living child may conduce to the interest even of foetal life, if it saves the mother to bear more children."

Treub<sup>12a</sup> of Amsterdam, after stating that in certain septic cases craniotomy is inevitable, deals with the argument advanced by Pinard against craniotomy "that the rôle of the physician is not to kill." Treub says "that a single case where after a craniotomy, a woman has survived to have living children by some other method, is sufficient to prove the impossibility of sustaining such a view." He adds that he knows of many such instances.

*The mortality* of craniotomy is very high, even in the present day with all the advantages of anæsthesia and asepsis, as the following statistics, collected by Munro Kerr<sup>41</sup> and Blacker,<sup>15</sup> show:—

|  | Mortality.         |
|--|--------------------|
| Munro Kerr's (1901—1906) (63 cases)              | - - 12·6 per cent. |
| Galabin's (1891—1901 (Guy's Hospital) (33 cases) | 9·0 "              |
| Rotunda Hospital (1896—1900) (6 cases)           | - 16·6 "           |
| Pinard (1892—1899)                               | - - 11·5 "         |
| Gusserow (1902) (47 cases)                       | - - 6·3 "          |
| Chrobak's Clinic in Vienna                       | - - 7·7 "          |
| Zweifel's Clinic in Leipzig                      | - - 7·0 "          |

The morbidity also (20–30 per cent.) is very large as compared with that of Cæsarean section, though considerably less than after pelviotomy (40–60 per cent.).

Such mortality and morbidity is largely due to the fact that in most cases fruitless attempts had been made to deliver by forceps or version and the parts were already bruised and often also infected.

The size of the pelvis which admits of a child being delivered after cephalotripsy or cranioclasm is differently given by different obstetricians, but it may be roughly stated that it should not be attempted if the conjugata vera is less than  $2\frac{1}{2}$  inches (6·2 cm.) in an equally contracted pelvis or less than 2 inches by 4 inches (5 by 10 cm.) (Herman<sup>21</sup> and Eden<sup>22</sup>) in a flat pelvis.

With a conjugata vera of  $2\frac{1}{2}$  inches (6·2 cm.) craniotomy has a maternal mortality of over 10 per cent. and a morbidity of 20 per cent. and is a difficult and tedious operation.

In the absence of previous attempts at delivery and in skilled hands where the conjugata vera is above  $2\frac{1}{2}$  inches (6·2 cm.) the mortality of craniotomy may be far less than this, thus Donald gives 18 consecutive cases, Lewers 6, Spencer 11, John Phillips 16, all without a death, whilst Leopold gives 71 cases with only 2 deaths, both from eclampsia.

Still the average mortality of craniotomy in general practice is about 8 per cent., distinctly less than that of Cæsarean section for contracted pelvis done under similar circumstances, *i.e.*, where other

attempts at delivery had been made. (See under Cæsarean Section and Table IV., p. 48.) As craniotomy, however, necessarily involves fœtal death, it is to be hoped that the time is not far distant when (as Matthews Duncan<sup>16</sup> said in 1889) the increasing safety of Cæsarean section and its substitutes will lead to its abolition when the child is alive.

In general practice where facilities for Cæsarean section or pelviotomy may not exist, it will still be advisable in a few rare cases to do craniotomy in the interests of the mother when the child is alive and the conjugata vera over  $2\frac{1}{2}$  inches.

By the courtesy of Sir Arthur Downes, of the Local Government Board, I have been able to ascertain the statistics of the last three years (1907-8-9) in the Poor Law Maternity Wards of the Metropolitan District (Workhouses and Infirmaries), where the very worst and poorest cases are admitted. Out of 8,991 total deliveries, 395 cases required surgical assistance. Of these, 59 were cases of contracted pelvis, in 18 of which (1 in 500 of total deliveries) craniotomy had to be performed, with 2 maternal deaths (11 per cent.). Five of the children were alive at the time of the operation, one of the mothers refusing to have Cæsarean section performed.

In obstetric clinics or at special hospitals in the hands of experts, craniotomy is now very rarely performed when the child is known to be alive, and it is only indicated if the child is thought to be deformed (hydrocephalus, etc.) or moribund, or where the patient is presumed to be infected, or where the risk to the mother of craniotomy is distinctly less than by any other method of delivery.

Thus at Queen Charlotte's Hospital, London, in 1909, out of 1,734 cases attended, including 67 cases of contracted pelvis, craniotomy was not once performed upon a living child, but was done 9 times upon dead children (1 in 193 cases), viz., once upon a hydrocephalic child, 4 times in contracted pelvis, and 4 times as a convenience with macerated infants. There was no maternal mortality.

The object of performing craniotomy in septic cases is that it enables the uterus to be emptied of its contents with antiseptic precautions, and at the same time the uterine wound of a Cæsarean section is obviated and a septic peritonitis is thereby prevented.

In performing craniotomy it is almost inevitable that abrasion will be produced in the cervix or vagina. In infected cases the risk is obvious, and it is probable that local tissue infection and perhaps a general infection may be prevented by some such method as Maxwell's intra-amniotic irrigation (see p. 19), before the operation, followed by a further intra-amniotic irrigation after the child is extracted, and by an intra-uterine irrigation of iodine and water at the end of the third stage.

In all cases where craniotomy is contemplated, and the child



alive, the wishes of the parents should be consulted, as it may happen not infrequently that a child is so much desired that some form of pelviotomy or Cæsarean section would be preferred to craniotomy even if the maternal risk were thereby increased.

### *Pelviotomy.*

Pelviotomy (symphysiotomy and pubiotomy) are operations recommended for obstructed labour in contracted pelves with a C.V. between  $2\frac{3}{4}$  inches and  $3\frac{1}{2}$  inches (6·9 cm. and 8·7 cm.).

Pelviotomy has had a curious history. The first recorded operation was a symphysiotomy performed by Jean Claude de la Courvée in 1655 on a patient dying during labour.

*Symphysiotomy* was, however, definitely introduced by the French obstetricians in 1777 after a successful operation by Sigault, and up to 1830, according to Baudelocque, there had been 41 operations with 14 maternal and 28 foetal deaths—a maternal mortality considerably less than that of Cæsarean section at that date. In Italy and Germany also the operation was cordially received. In Great Britain symphysiotomy was at first considered to be a possible substitute for craniotomy in cases of moderate pelvic contraction not seen early enough for the induction of labour, but it soon fell into disrepute, and Churchill,<sup>17</sup> writing in 1842, speaks strongly against it and remarks that it was performed in the year 1782 “for the *first and last time* in this country by Mr. Welchman, of Kingston, Warwickshire.”

Symphysiotomy was still entirely unpractised in Great Britain in 1865 according to Hall Davis<sup>18</sup> and Murphy.<sup>19</sup> In 1866 it was revived by Morisani and Novi in Naples, and since 1885, owing mainly to the introduction of antiseptics, far better results have been obtained, both as regards maternal and foetal mortality and maternal morbidity.

These operators also combined symphysiotomy with induction of premature labour, thus being able to induce labour at a later date than would be otherwise required.

Since 1892 symphysiotomy has been widely practised over Europe and America, but has made smaller progress in Great Britain than elsewhere.

Recent statistics are those collected by Munro Kerr,<sup>20</sup> who in 1908 collected from all countries 275 cases of *symphysiotomy* with a maternal mortality of 6·5 per cent. and a foetal of 10 per cent. Others give the foetal mortality as 6·6 per cent.

Pinard states that in symphysiotomy the pubic bones can be safely separated 6 cm. (2·4 inches), much more than was at first thought desirable. This maximum separation means an antero-posterior gain of 15 mm. ( $\frac{3}{8}$  inch) and the total gain by the projection of the head through the gap is 22 mm. or  $\frac{7}{8}$  inch (Blacker<sup>23</sup>).

The gain transversely is clearly greater still, so that the operation is more useful in generally contracted, or in generally contracted flat pelves than in flat pelves.

*Subcutaneous symphysiotomy* was successfully practised by Herman<sup>24</sup> in 1899 in 8 cases. He prefers to divide the symphysis with a tenotomy knife from below upwards. Ayres<sup>31</sup> cuts from above downwards. No sutures are required. These subcutaneous operations are considered to be more adapted to "suspect cases," cases probably infected.

*Pubiotomy* was performed in Italy for the first time by Professor Catolica and M. Galbiati in 1819, though pubiotomy or rather ischio-pubiotomy had been suggested in 1784 by Aitken,<sup>25</sup> of Edinburgh. It was not, however, fully described till 1844 when Stoltz again performed it.

Pubiotomy, as performed by Döderlein, has lately been preferred to symphysiotomy, as being easier and safer. Walcher's modification of dividing the bone at the level of the outer limit of the labium majus, or Pinard's (*Annales de Gynéc.*, 1892) ischio-pubiotomy seem good substitutes, as by their incisions the connective tissue is less extensively exposed. The open method has been largely superseded by the subcutaneous one as advised by Bumm, a Gigli's saw being used to divide the bone.

The mortality of subcutaneous pubiotomy in 217 cases was, according to Döderlein, 4·1 per cent., whilst it was 10·1 per cent. in 77 cases done by the open method, or 5·9 per cent. in the 294 cases combined.

Leopold<sup>27</sup> (60 cases), Bumm<sup>28</sup> (53) and Bürgers (30) show a mortality of only one case and a foetal mortality of 6·6 per cent. Such results have not been equalled by others.

There have been recently two valuable discussions in London on pelviotomy in contracted pelves, following papers by Dr. Hastings Tweedy<sup>5</sup> of Dublin, and Dr. Blacker<sup>29</sup> of London.

During the discussion stress was laid upon the need for full dilatation of the soft parts before any form of pelviotomy was adopted, and because of the difficulty in insuring this some of those who have performed the operation, such as Munro Kerr, only recognise its justifiability in multiparæ. It was recognized by practically all speakers that there is no place for any form of pelviotomy for cases where the conjugata vera is under 3 inches, when Cæsarean section or craniotomy would be performed. Nor for cases where the conjugata vera is over 3·5 inches in flat pelves and 3·8 inches in generally contracted pelves when spontaneous delivery may confidently be expected at or near full term, except when the head is abnormally large. According to Blacker, Kronig has found that with a conjugata vera of 3·4 to 3·8 inches (8·5—9·5 cm.) 86·5 per cent. of the labours were terminated spontaneously, or 94 per cent. with the

assistance of forceps, and Schauta has proved that such spontaneous deliveries have a maternal mortality of 0·09 per cent. and a foetal mortality of 4·1 per cent. Munro Kerr quotes Boenninghausen as giving the foetal mortality for spontaneous delivery in generally contracted pelves as 2·2 per cent. and for flat rachitic pelves as 2·7 per cent., while in artificially terminated labours in similar pelves the mortality was 41 per cent. and 47 per cent. respectively. Such results as these cannot be improved upon by any form of operative interference.

English statistics point in the same direction, thus Eden<sup>11</sup> states that at Queen Charlotte's Hospital in the years 1905-8, out of 309 cases of contracted pelvis 42 went to full term and were delivered spontaneously with a foetal mortality of 4·7 per cent., and 74 cases in which the conjugata vera was  $3\frac{1}{2}$  inches or more were delivered by forceps with a mortality of 18·7 per cent.

The discussions mainly turned on cases with pelves having a conjugate of 3·3-3·6 inches (7·5—8·5 cm.) which, in the absence of pelviotomy or spontaneous delivery, would largely be treated by induction of premature labour if seen early enough in pregnancy, or by craniotomy or Cæsarean section if actually in labour. No speaker was in favour of substituting pelviotomy for these cases as a routine practice.

It has already been shown that the maternal mortality of induction of premature labour is less than 1 per cent., whilst that of pelviotomy may be taken as between 4 per cent. and 6 per cent. according to various statistics; while the infantile mortality of the former is from 8—12 per cent. in suitable cases as against 6 to 10 per cent. in pelviotomy. The chief objection to either symphysiotomy or pubiotomy is not so much the maternal mortality but the high degree of morbidity which follows the operations, especially where infection has already occurred.

Herbert Spencer<sup>32</sup> gives the following data of morbidity:—"In the 510 cases of pubiotomy collected by Schläfli hæmatoma was observed in 17 per cent.; severe tears in 15·4 per cent. (of these 12·6 per cent. died), injuries to the bladder in 12 per cent., thrombophlebitis in 8 per cent. Of 120 cases investigated later, hernia through the gap of the bone was found in 7·5 per cent., prolapse of the vagina in 24 per cent., chronic incontinence of urine in 4 per cent. Of the mothers 4·9 per cent. and of the children 9·6 per cent. died. In 117 cases of induction of premature labour von Herff had had one maternal death and 80 per cent. of the children left the clinic alive. The results of 53 cases of pubiotomy in Bumm's clinic given by Krämer showed that in over 3 per cent. the bleeding was profuse, and in five cases hæmatoma, œdema and thrombi occurred. In 12 spontaneous deliveries there were three unimportant injuries to the soft parts, and the bladder was injured three times by the

needle and healed spontaneously, while in the remaining 41 women delivered artificially there were seven injuries of the bladder or urethra, and in 19 cases the soft parts were extensively torn; only one mother died, but 54 per cent. had fever in the puerperium, and 13·4 per cent. of the children died."

It must be remembered that in Döderlein's open pubiotomy a compound fracture is practically produced, and if sepsis be present the risk is necessarily great. Much the same risk applies to symphysiotomy by the open method.

Even subcutaneous symphysiotomy, as practised in 1899 by Herman, and subcutaneous pubiotomy as introduced by Bumm in Germany and recommended in this country by Hastings Tweedy, are not perfectly safe if the patient be already infected.

In a paper read at the British Medical Association Meeting in London this year, Professor von Herff,<sup>11a</sup> of Basle, said that the mortality of the mother was increased by symphysiotomy by 8 per cent., by subcutaneous hebstectomy and subcutaneous symphysiotomy by 4 per cent., and the maternal morbidity was disproportionately great—whilst 8 or 9 per cent. of the children died. He considered pelviotomy should only be employed as a last resource.

In the United Kingdom neither symphysiotomy nor pubiotomy have been much practised. Cases have been done by Buist, Donald, FitzGibbon, Griffith, Herman, Johnstone, Munro Kerr, Lewers, Russell, Hastings Tweedy, Wallace, Walls, and others. Even by most of these, however, pelviotomy would rarely be advised if the women were seen early enough during pregnancy for premature labour to be induced, unless previous inductions had resulted in stillborn deliveries and Cæsarean section was for some reason inadvisable. Very few of these obstetricians would operate if the case was probably infected.

A few (Hastings Tweedy) consider  $2\frac{3}{4}$  inches the smallest conjugata vera for any pelviotomy. Most prefer not to operate under 3 inches. Munro Kerr, who has done 18 cases, considers  $3\frac{1}{4}$  inches (8·1 cm.) the lowest pelvic deformity, and he would never operate on a primipara.

Many operators,\* however, would give pelviotomy a possible place, as an alternative mainly to craniotomy, in some such cases as the following, viz., where labour is advanced, the child alive, the head impacted in the pelvis, and unable to be delivered by forceps, where very little more room is apparently needed, and where the case is probably aseptic, and in a suitable environment (hospital).

\* Russell Andrews, Barbour, Halliday Croom, Eden, Haig Fergusson, FitzGibbon, Gibson, Griffith, Hewetson, Jardine, Jellett, Johnstone, Munro Kerr, Kynoch, Lea, McCann, Playfair, Purefoy, Russell, Darwall Smith, Stevens, Swayne, F. E. Taylor, Hastings Tweedy and H. Williamson, Spencer and Blacker would only do pubiotomy, if the patient refused Cæsarean section, supposing those two were the alternatives.

If the case were probably infected the choice would lie between Cæsarean hysterectomy and craniotomy, putting aside for the moment extra-peritoneal Cæsarean section. Craniotomy would give the patient the chance of a child at a subsequent pregnancy and would by most operators be preferred to Cæsarean hysterectomy which would sterilize her. Here, however, the patient and her husband would be consulted and their decision accepted. (See p. 18 Cæsarean section in septic cases.)

The majority of operators in the United Kingdom\* consider that induction of premature labour, Cæsarean section with or without hysterectomy, and craniotomy cover all cases of pregnancy in contracted pelvis, and their main reason against pelviotomy is the very large morbidity which at present follows the operation.

*The choice between Pubiotomy and Symphysiotomy.*

Pubiotomy is preferred by Barbour, Blacker, Haig Fergusson, FitzGibbon, Gibson, Hewetson, F. E. Holland, Johnstone, Munro Kerr, McCann, Playfair, Purefoy, and Wilson. Blacker gives the following reason for the preference:—It does not open a joint; there appears to be less risk of immediate and remote complications, and both the maternal and the foetal mortality are less than after symphysiotomy. Hastings Tweedy who has performed two symphysiotomies and five pubiotomies according to Döderlein's method, prefers subcutaneous pubiotomy as advocated by Bumm, which he has performed once, but urges specially that the vagina should be thoroughly dilated by wool pledgets to facilitate subsequent delivery.

Buist, Eden, Griffith and Malins prefer symphysiotomy to pubiotomy owing to its simplicity, whilst Russell Andrews and Lea prefer the subcutaneous form of that operation.

If the morbidity following pelviotomy could be materially lessened, the time may come when obstetricians in the United Kingdom will adopt the operation when the head is impacted in the pelvis and very little more room is apparently required to deliver it, and will further in many instances advise women with contracted pelvises with a conjugata vera of 3 inches to  $3\frac{1}{4}$  inches (7·5—8 cm.) to go to full term instead of having premature labour induced before the 35th week. If the child be alive it will then be a question whether some form of Cæsarean section will be adopted, or some form of pelviotomy. Probably if the woman is a primipara and has never been delivered of a child, dead or alive, she will be treated by

\* Blair Bell, Stanmore Bishop, Cameron, Champneys, Croft, Dakin, Donald, William Duncan, Fairbairn, Favell, Haig Fergusson, Fothergill, Gow, Grimsdale, Haultain, Hellier, Herman, Handfield-Jones, Lewers, Lockyer, Lyle, Maclean, Mansell Moullin, Newnham, Pearson, John Phillips, Phillips (Sheffield), Purslow, Rayner, Robinson, Routh, Scharlieb, Spencer, Stabb, Stookes, Tate, Bellingham-Smith, Walls and Willett of Liverpool.

Cæsarean section, but if she has previously had her soft parts dilated and labour is advanced, pelviotomy may be selected. With, however, a morbidity of 40 per cent. British operators are at present, speaking generally, averse to the operation.

The question of subsequent pregnancies in connection with pelviotomy is also important. Cæsarean section can be repeated with small risk to the mother, or if need be the patient can at the same time be sterilized. There is not yet sufficient evidence as to the course of repeated labours after pelviotomy. If the pelvis were found to be permanently enlarged by the first operation and the woman's chances improved in subsequent labours, it would be a strong point in favour of the operation, but apparently any permanent enlargement of the pelvis means some dyskinesia, some lessening in the activity and mobility of the patient.

Meanwhile Zweifel and Pinard both consider that symphysiotomy does actually lead to a permanent enlargement of the pelvis, and Thies says that spontaneous delivery occurs more frequently by 50 per cent. after symphysiotomy than before it. Can the same be said after pubiotomy? \*

G. Schickele<sup>33</sup> of Strasburg with a view to permanent enlargement of the pelvis has described a mode of pubiotomy by sawing through the bone so as to form a series of steps. Complete bony union does not take place, connective tissue filling in the gaps.

Further evidence on these points is awaited with interest.

### *Cæsarean Section.*

In France the operation was much in favour during the first half of the 19th century, and according to Dufeillay it was sometimes done as a pre-arranged selection in cases of contracted pelvis without other efforts at delivery having been made. Such cases must however have been few for Godson<sup>41a</sup> and Budin<sup>33a</sup> have stated that there had been no successful case in Paris between 1787 and 1879, when Tarnier performed his first "Porro."

In Great Britain at all events the results were very bad owing to the operation being only adopted as a last resort.

The teaching of Mauriceau<sup>34</sup> of Paris, whose work on the "Diseases of Women with Child" was translated into English by Hugh Chamberlen in 1752, had greatly influenced British Obstetricians. Mauriceau considered Cæsarean section "a damnable policy martyring and killing the mother to save the child and advised that it should never be done till the mother was dead," and although he was no doubt largely influenced by Roman Catholic doctrine he

\* Cova of Rome, at the recent International Congress of Obstetrics at St. Petersburg, stated that he had observed subsequent labours after hebstectomy in 13 cases, in 7 of which he found that the pelvis had remained dilated.

advised that a living child should be destroyed by embryotomy "rather than resolve upon that cruelty and barbariousness of the Cæsarean section in which it is absolutely impossible that a woman should ever escape."

This teaching seems to have held sway in Great Britain for the next 70 years, only very few cases of Cæsarean section being performed. Blundell<sup>2</sup> gives a list of 23 cases,\* the only cases that had been performed up to 1821, but always with fatal results except one by Barlow<sup>35</sup> published in 1793.

Cæsarean section was in fact looked upon as so certainly fatal that it was only done as a forlorn hope after every other means had been adopted to deliver the child, to prevent the woman dying undelivered.

In 1866 Playfair<sup>36</sup> stated at the Obstetrical Society of London that the mortality was 89 per cent. Up to 1882 Greenhalgh of St. Bartholomew's Hospital had had 10 cases with 9 deaths. Spencer Wells's<sup>31</sup> mortality after ovariectomy was 28 per cent in 1866, and only 11 per cent in 1882.

The use of chloroform anæsthesia by Simpson of Edinburgh in 1847, the introduction into Great Britain of Semmelweiss's views of the septic origin of puerperal fever by C. H. F. Routh<sup>39</sup> in 1848, Pasteur's discoveries of the causes of putrescence, fermentation and sepsis, the improved details in technique suggested by Spencer Wells<sup>40</sup> in 1864 (uterine sutures), by Porro (1876), Sanger<sup>51</sup> (1882), Leopold<sup>52</sup> and others, and the introduction of antiseptics (1867—1893) through the genius of Lord Lister have made the operation of Cæsarean section relatively safe.

In 1876, Porro introduced the alternative operation of supra-vaginal hysterectomy, and for a time it seemed as if that operation would take the place of the conservative Cæsarean section.

In January 1884, Dr. Clement Godson's<sup>41a</sup> paper in the *British Medical Journal* drew attention to Porro's operation, giving a case of his own (Case 4), the first successful one in Great Britain, together with a list of 137 similar operations by others, with a total maternal mortality of 55·8 per cent., and for a time this operation was regularly adopted in England. Thus in the table of cases collected in this paper, it will be seen that between 1882 and 1888 inclusive 7 out of the 9 cases there recorded were dealt with by supra-vaginal hysterectomy with extra-peritoneal treatment of the stump.

In February 1889 Dr. (now Sir Francis) Champneys<sup>41b</sup> of London,

\*The operation had also been performed successfully by an illiterate woman, named Mary Dunally, in Tyrone, Ireland, in 1737. She operated with a razor, extracted the infant and held the wound while a messenger was despatched a mile away for some silk and tailors' needles. She smeared the wound with the whites of eggs.

drew attention to the value of Sanger's improved technique of the conservative Cæsarean section (1882), and described a successful case of his own performed in March 1888 (Case 9), emphasizing particularly Sanger's musculo-muscular and sero-serous sutures. This paper was definitely epoch-marking, and stemmed the tide which had set in in favour of Porro's sterilizing and more radical operation. Thus in the collected cases during the following 3 years the "Porro" operation was done 9 times (with 1 death), and Cæsarean section 18 times (with 4 deaths). Dr. Champneys showed that the increasing success of Cæsarean section had put an end to its limitations to cases of absolute contraction where a child could not be delivered *per vias naturales*, and that its limits should now extend upwards into the class of relative contraction, and he considered that if it could be shown in a given case that Cæsarean section was not more dangerous to the mother than craniotomy the former should be the operation performed.

In the following month, April 1888, Dr. Murdoch Cameron of Glasgow had another successful case of Sanger's Conservative Cæsarean section (Case 10), and in March 1891 he was able to publish a list of ten consecutive cases, nine of which recovered, stamping himself as the pioneer with Sir Francis Champneys of the modern operation in the United Kingdom.

The advantages of conservative Cæsarean section over the more radical operation became so well established, that in a few years the latter operation was rarely performed. Thus in 1902 out of 45 operations for contracted pelvis in the Tables 43 were treated by Cæsarean section alone: the other two being dealt with by supra-vaginal hysterectomy, with intra-peritoneal treatment of the stump. The operation of sub-total hysterectomy with extra-peritoneal treatment of the stump (Porro) had practically ceased to be an alternative to conservative Cæsarean section by 1899 or 1900.

The mortality of Cæsarean section has steadily diminished; thus it was 38 per cent. in Glasgow in 1891—1896, 20 per cent. in 1902, about 12 per cent. in 1904, and it may now be said that Cæsarean section in the United Kingdom has become an operation with hardly any morbidity, and with a mortality when performed for contracted pelvis under "favourable" circumstances of 2·9 per cent. (see Table IV. and other statistics at end of paper), which certainly does not exceed that of other gynæcological cœliotomies.

In this connection it may be noticed that in 1906, 90 cases of Cæsarean section for contracted pelvis are recorded in the tables, with 2 deaths, or 2·2 per cent., and in 1908, 154 cases with 7 deaths, a mortality of 4·5 per cent.

I have endeavoured to ascertain the saving of life in cases of contracted pelvis which has resulted from the present extended performance of Cæsarean section for relative indications, as com-



pared with the results following the performance of Cæsarean section when done almost solely for absolute indications, *i.e.*, where the *conjugata vera* is under  $2\frac{1}{4}$  inches (5·6 cm.).

For this purpose Dr. J. B. Banister has worked out for me the statistics at Queen Charlotte's Hospital during the two decades 1890—1899 and 1900—1909. Roughly speaking these decades at that hospital represent the periods before Cæsarean section was generally practised, and the period when it was adopted according to modern indications.

In the first decade (1890—99) 10,529 women were attended in labour. Of these 135 had contracted pelvis with a *conjugata vera* of  $3\frac{1}{2}$  inches or under. Delivery was effected by Cæsarean section in 7 cases with one maternal and one foetal death; by symphysiotomy in 2 cases, both children dying; by craniotomy in 28 cases, with 2 maternal deaths. The total foetal mortality of this decade in these 135 cases was 58·5 per cent. The total maternal mortality was 2·96 per cent.

In the second decade (1900—1909) 15,222 cases were attended in their confinements. Of these, 259 were cases of contracted pelvis. Delivery was effected by Cæsarean section in 74 cases with 3 maternal and 8 foetal deaths; by 1 symphysiotomy, both mother and child living; by craniotomy in 13 cases in only three of which the child was alive, with a maternal mortality of one. The total foetal mortality of this decade in the 259 cases of contracted pelvis was 22·4 per cent. The total maternal mortality was 2·31 per cent.

It will thus be seen that whilst there was only a saving of the lives of mothers in 0·65 per cent., the saving of foetal life was 36 per cent., a practical result of enormous value and significance.

Amongst the cases of contracted pelvis collected for the purpose of this paper from living obstetricians, the first recorded case of Cæsarean section was performed by Lloyd Roberts in 1867 (Case 1), the first successful ones by Champneys and Murdoch Cameron in 1888 (Cases 9 and 10). The first supra-vaginal hysterectomy with intra-peritoneal treatment of the stump was by A. R. Simpson in 1881 (Case 3), the uterine stump being ligatured in three divisions and dropped into the abdomen without covering it with peritoneum. The first successful supra-vaginal hysterectomy with external treatment of the stump was by Clement Godson in 1882 (Case 4). The first successful supra-vaginal hysterectomy with intra-peritoneal treatment of the stump was by Sinclair in 1892 (Case 50)—the stump being covered by peritoneum. The first Cæsarean-pan-hysterectomy for contracted pelvis was performed successfully by Donald in 1897 (Case 129).

*Indications for Cæsarean Section in cases of Pelvic Contraction.*

*Conjugata vera up to  $2\frac{1}{2}$  inches (6·2 cm.). The patient at full term or in labour.* It is an absolute indication to perform Cæsarean

section if a woman cannot be delivered *per vias naturales* of a child living or dead. An alternative operation, extra-peritoneal Cæsarean section, introduced in Germany in 1907 is discussed elsewhere.

*Conjugata vera*  $2\frac{1}{2}$  inches—3 inches.

It is agreed that there is a strong relative indication that Cæsarean section should be performed if the child be living when the *conjugata vera* is between  $2\frac{1}{2}$  inches and 3 inches; but if infection is feared, other steps should be taken (see p. 20).

*Conjugata vera* 3 inches— $3\frac{1}{2}$  inches.

The main discussion will turn upon the relative values of Cæsarean section and pelviotomy with a *conjugata vera* between 3 inches and  $3\frac{1}{2}$  inches. If the child be dead, craniotomy should certainly be done. If the child be living, and the case aseptic, conservative Cæsarean section should be performed.

If the child be living and the head has partly entered the brim and there appears to be very little more room needed for delivery to take place, and yet forceps have failed, it becomes as already stated the ideal place for some form of pelviotomy, if it should ever become free from its present post-operative morbidity.

When the *conjugata vera* is more than  $3\frac{1}{2}$  inches delivery is usually effected by the natural efforts or by axis-traction forceps or version, but here again further assistance by Cæsarean section or pelviotomy may be required if the head be found to be relatively too large.

#### CÆSAREAN SECTION IN "SEPTIC CASES."

If as a matter of routine women were examined during the course of their pregnancies, their contracted pelves would be discovered and appropriate treatment would be recommended at suitable dates, and "suspect" and "infected" cases would not arise.

If, however, a woman is in labour and has been examined, or attempts have been made to deliver her before admission she may be infected.

It must, however, be remembered that the infection is very recent, and that the uterus is largely protected by the membranes from direct contact with the infecting organisms. Only the cervix and vagina are exposed, and if they are not injured or abraded the risk of general infection at the time when the patient is usually seen is small.

It is this which makes craniotomy safer than Cæsarean section, for immediately after extraction of the child the amniotic cavity can be freely irrigated, and at the end of the third stage the uterus can also be irrigated, with 3 or 4 pints of iodised water. Whereas

if Cæsarean section is performed, the uterine incised wound is exposed to the infecting germs, which would probably prevent primary union and if so would cause a fatal peritonitis. This is probably true even if they were only putrefactive organisms and not virulent pathogenic germs.

The mortality of Cæsarean section is largely in these septic cases.

In the mortality statistics of the cases collected in this paper (see Table IV, p. 48), it is seen that in cases of Cæsarean section where *attempts had been made to deliver by forceps, etc., or where repeated examination had been made* the mortality was 22 out of 64 cases=34·3 per cent., and in 166 cases where it is stated that the patient was *in labour and the membranes were ruptured but no attempts had been made to deliver*, the mortality was 18=10·8 per cent. On the other hand in 224 cases where the patient was *in labour with membranes unruptured* the mortality was only 5=2·2 per cent., and in 245 cases "*not in labour*" the mortality was 9 or 3·6 per cent.

From these data it seems clear that if frequent examination and attempts at delivery have been made the case is almost certainly septic and should be treated at such. It is probable also that infection may be present if the membranes have been ruptured for some time and examinations made before admission, but the experience and reliability of those who have previously dealt with the case must be taken into consideration.

If cases "*not in labour*" are combined with cases at the "*beginning of labour with the membranes intact,*" and with cases "*kept in hospital some days before operation,*" in all 469 cases, the mortality is only 2·9 per cent. (see Table IV, p. 48), whereas in the 230 cases where the membranes were ruptured, or where frequent examinations or attempts at delivery had been made, the mortality was 17·3 per cent.

The difficulty is to be sure that the patient is infected and nothing but a reliable bacteriological investigation of the liquor amnii remaining in the uterus can make this point clear. Such symptoms as feverishness, offensive discharge, or tender uterus would clearly indicate infection.

In the presence of such symptoms and in the absence of a reliable bacteriological report these cases will be "*suspect*" and most will be rightly treated as definitely "*infected.*"

In doubtful cases of infection where the membranes are ruptured R. D. Maxwell of the London Hospital has recommended and adopted in one case (No. 1275) an excellent prophylactic measure of irrigating the uterine (amniotic) cavity per vaginam before performing Cæsarean section. A soft pewter or other pliable tube is passed up to the fundus uteri, and the amniotic cavity, and incidentally the foetus, is freely irrigated with normal saline

solution at 100° F. Possibly a saturated boric acid solution would be more useful if micro-organisms were present. The method is of course available in all degrees of pelvic contraction.

It is possible that this method might have been useful in cases 341, 811, 946, 1045, and many others. Such cases as 946, 1090, 1121 show however that cases which appear most unfavourable may recover without such aid.

Whether it is possible to so thoroughly irrigate the amniotic cavity that all putrefactive organisms can be washed away or rendered harmless is only a question which can be settled by experience.

If most of the liquor amnii had drained away, and especially if the uterine muscle were contracted down on the child, such irrigation could only be very partial. The difficulty too of dislodging germs from fetal apertures and irregularities, or those luxuriating in a vernix caseosa is evident. Still it is an additional method at our disposal and may prove of great value. In any case the irrigation must "lessen the dose," for it dilutes the poison present.

If Maxwell's method, or some modification of it, should prove serviceable it would largely prevent craniotomy with living children, in cases where there was no virulent infection present. Such rapidly multiplying and invading pathogenic germs as streptococci, etc., could hardly be successfully dealt with even in a case very recently infected, by any irrigating fluid which was not so powerfully antiseptic as to cause serious injury to the fœtus.

The line of treatment in "suspect cases" then seems to be somewhat as follows:

All forms of symphysiotomy, hebeosteotomy, and extra-peritoneal Cæsarean section are at present not considered suitable for these septic cases, owing to the very large post-operative morbidity which would then attend them.

In all cases the uterus should be eventrated before incision and the abdominal cavity carefully guarded.

*In contracted pelves with C.V. under 2½" (6·2 cm.)* hysterectomy should follow the Cæsarean section in cases where Maxwell's irrigation is not thought a possible means of enabling a conservative Cæsarean section to be done.

*With a C.V. of over 2½" with a dead child* craniotomy (with such precautions as stated on p. 8) is indicated, although if virulent infection is present hysterectomy would probably be the better treatment.

*With a C.V. of over 2½" (6·2 cm.) the child being alive.* Here the alternatives are clearly craniotomy and Cæsarean hysterectomy.

If the parturient canal be probably infected when the patient is first seen, and the fœtal heart indicates weakness, or the child is hydrocephalic or probably injured, the majority of British

obstetricians would prefer to do craniotomy with previous and subsequent intra-uterine irrigation, in the interests of the mother, believing that it would give her a better chance than Cæsarean hysterectomy which is necessarily also a sterilizing operation.

If the patient were feverish and ill and the uterus tender, indicating that the infection had probably spread into the uterine tissue or even into the patient's blood, and especially if pathogenic germs were found in the uterus or vagina by bacteriological examination hysterectomy should be performed to prevent further infection.

If hysterectomy were done most operators would prefer supra-vaginal amputation of the uterus with intra-peritoneal treatment of the stump.

In the 230 cases of C.S. for contracted pelvis here collected where the membranes had been ruptured before admission, or where frequent examinations or attempts at delivery had been made, Cæsarean section was performed in 216 cases with 40 deaths, a mortality of 27·7%, whereas in the other 14 cases which were further treated by supra-vaginal hysterectomy with intra-peritoneal treatment of the stump, there was no mortality, all the women recovering. (See note †, Table IV., p. 48).

Some would possibly prefer the original (1876) Porro-hysterectomy with extra-peritoneal treatment of the stump.<sup>1</sup> There is no doubt that this method more effectively shuts off the peritoneal cavity from the infected cervix and vagina than where intra-peritoneal treatment of the stump or panhysterectomy is adopted. Thus it seems particularly indicated in such cases as acute gonorrhœa (Case 441 and possibly 496). An increasing number will prefer to perform panhysterectomy—the theoretically ideal operation—with the idea that the cervix being septic might prove to be a source of infection. (See Tables IV. and V., pp. 48 and 49 and their footnotes.)

*Addendum. November, 1910.*

As a result of suggestions made by foreign speakers at the Congress, I am not without hope that a rapid bacteriological examination of films prepared from the liquor amnii or from the cervix or upper vagina in "suspect cases" when the membranes are ruptured will enable the treatment of these cases to be put on a more scientific basis. It is evident that if frequent examinations have been made

1. In connection with the question of sub-total hysterectomy for septic cases it is interesting to note that in Blundell's (2) Lectures given at Guy's Hospital in 1830-31, he suggested that such an operation might save many lives. He performed the operation four times on rabbits, firmly suturing the uterine stump to the anterior abdominal wall, bringing the ligatures through the abdominal wound. A ligature slipped in one case, but the other three rabbits recovered. He adds: "Perhaps this method of operating may hereafter prove an eminent and valuable improvement."

or forceps used, and the upper vagina is found infected, the amniotic cavity will also be infected.

It is not necessary, therefore, in such cases to obtain intra-uterine swabbings.

Mr. A. N. Leatham, bacteriologist at Charing Cross Hospital, has very kindly replied to my enquiry as to whether it is possible to make a satisfactory and *reliable* bacteriological examination of such swabbings by means of stained films, and to give a reliable report within an hour as to the presence or absence of pathogenic or saprophytic organisms. His reply is "that films could be made and stained from uterine swabbings and, if the organisms were present in considerable numbers, a reliable report as to the presence of streptococci, staphylococci, or pneumococci could be given *within half an hour*. If bacilli were present it would be more difficult to decide as to the presence of *B. coli*, although in some cases it would probably be possible to say that the bacilli present in the films were all saprophytic."

I hope at a later date to ascertain whether reports from the examination of films prepared rapidly can be relied upon, by having cultures made from the same swabbings and seeing whether the culture results coincide with the reported results of the film tests.

If reliable bacteriological data can be thus forthcoming within an hour of the patient's admission, and the presence or absence of infection certified, and the variety of the germs present identified, it seems to me that the exact form of the operation required would be indicated with much greater scientific accuracy than is now possible. Thus classical Cæsarean section would be performed with perfect security if the fluid were sterile; Cæsarean section, preceded by some variety or some evolution of Maxwell's intra-uterine irrigation and by eventration of the uterus, might be considered safe if only putrefactive germs were found; and a radical hysterectomy would probably be considered desirable if pathogenic micro-organisms were discovered.

It is possible that some such scientific basis may do away with the need for craniotomy with living children in well-organised obstetrics clinics, but craniotomy with irrigation safeguards would still be required in general practice where prompt bacteriological investigation and special technical experience might not be forthcoming.

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#### THE OPERATION OF CÆSAREAN SECTION AS PERFORMED IN THE UNITED KINGDOM.

The most suitable date for performing C.S. appears to be at the onset of labour (see Table IV., p. 48), if the patient is already in hospital, and next to that before labour has commenced.

The technique of the operation is not different from that used abroad. As the operation has often to be done promptly the skin should be prepared, at all events in emergency operations, by the iodine method, 2% solution. The uterus is not turned out of the abdomen before being incised except in cases where the membranes are ruptured and there is a possibility of the remaining liquor amnii being infected.

The incision is made longitudinally in the midline anteriorly, or posteriorly if there be a fibroid in the anterior wall, avoiding the lower uterine segment. Fritsch's transverse<sup>42</sup> fundal incision has been given a fair trial, Munro Kerr<sup>43</sup> having used it 9 times, but he "did not find it any great advantage" and has now discontinued it. A sagittal fundal incision as proposed by Müller, Caruso, and Morisani is not liked. Munro Kerr draws attention to one objection to a fundal incision, viz., that the placenta is more often cut into. He gives 40% in his own case, 35% in Schroeder's, 41% in Hubl's, and 54% in Braum von Fernwald's.

The elastic ligature is not used. The child is extracted by first lifting out the head to prevent it being gripped by the contracting uterus. Some prefer to extract the child by the feet. After extraction of the child and placenta and membranes the patency of the cervix is ascertained and hot sterile water may be poured into the uterus. The uterus is then grasped bilaterally by the two hands of the assistant, and the cut surfaces everted till they are flat. The deep and superficial sutures<sup>1</sup> can then be inserted by curved, or, as I prefer, by long straight needles. The deep interrupted sutures should be sero-muscular and must take up the whole of the muscle tissue; the superficial suture (of fine silk or catgut) may be continuous and should be serous only, and should take up sufficient peritoneum to completely cover in the knots of the deep sutures.

Of the 81 operators in the United Kingdom who have sent particulars, 41<sup>2</sup> use silk for the deep sutures, 27<sup>3</sup> catgut, 8<sup>4</sup> silk-worm gut, and 4<sup>5</sup> linen thread.

1. No uterine sutures were used in Great Britain up to 1865, at all events during the previous few decades, but in 1863 Spencer Wells<sup>44</sup> advised their use, and he first sutured the uterus in 1865, the patient surviving. He used a continuous silk suture, one end of which he passed into the vagina to be withdrawn thence some days afterwards. At that date sutures were strongly opposed by Greenhalgh, Robert Barnes<sup>44</sup> and many others.

In 1870 Braxton Hicks<sup>45</sup> and Robert Barnes<sup>46</sup> used silver wire, passing through both uterus and abdominal wall. In 1876 carbolyzed catgut was used for the uterine wound by Galabin, Meadows and C. H. F. Routh,<sup>47</sup> and fishing gut by Galabin,<sup>48</sup> but all these patients died.

In 1879 Braxton Hicks<sup>49</sup> first used interrupted silk sutures, and this is now mainly used for the deep sutures.

2. Barbour, Berkeley, Bishop, Blacker, Bonney, Braithwaite, Cameron, Champneys, Croft, Dodd, Duncan, Edge, Fairbairn, FitzGibbon, Fothergill, Giles, Grimsdale, Haultain, Handfield-Jones, Jellett, Kynoch, Lea, Malins, Newnham, Phillips (London), Playfair, Purefoy, Purslow, Rayner, Routh, Savage, Mrs. Scharlieb, Sinclair, Spencer, Stark, Stevens, Tate, Taylor, Tweedy, and Mrs. Willey.

3. Russell Andrews, Buist, Donald, Favell, Haig Ferguson, Gemmell, Hellier, Hewetson, Jardine, Johnstone, Munro Kerr, Lackie, Lyle, Martin (Sheffield), Mansell Moullin, Pearson, Russell, Heywood Smith, B. Smith, Stookes, Swayne, Targett, Wallace, Wilson, Willett (Liverpool).

4. Gow, Holland, Lewers, Lockyer, McCann, Robinson, D. Smith, Stabb, and Williamson.

5. Barber, Dakin, Griffith, and Phillips (Sheffield).

## STERILIZATION.

### *Historical.*

The first mention of Sterilization<sup>53</sup> in cases of contracted pelvis that I can find is Blundell's advice (given in 1819 when Cæsarean section had a mortality of 95%) that every woman upon whom Cæsarean section was performed should have a portion of each Fallopian tube removed. He further made the suggestion in 1830 that all women known to have contracted pelvises should be sterilized before marriage in a similar way.

Under what circumstances is an operator now justified in sterilizing a patient whilst performing Cæsarean section for contracted pelvis?

### *The Ethics of the question.*

I know of no subject connected with the Ethics of Surgery upon which opinion more varies than the question of Sterilization in Cæsarean section.

I exclude from consideration hysterectomy performed for fibromyomata, carcinoma, infection, or uncontrollable hæmorrhage, and also oöphorectomy in cases of osteomalacia, inasmuch as the object of the operations is in such cases entirely outside the question of Sterilization. Most obstetricians consider that the patient (and her husband) should be consulted and be given the opportunity, after hearing the risks of another pregnancy, of deciding whether she should be sterilized or not. In some cases the patient would leave it to the operator to decide at the operation according as to whether the child seemed likely to survive or was stillborn or maldeveloped. The question must be fairly represented to the patient and the risks of rupture of the uterus in a future pregnancy told her. That rupture through or adjacent to the scar is a real, though relatively a small risk is clear from 120 cases of such rupture collected by Olhausen<sup>54</sup>, and others by Brodhead,<sup>56</sup> Munro Kerr,<sup>55</sup> and Wallace,<sup>57</sup> and quite recently by Singer<sup>57a</sup>. On the



other hand the operator would explain that the chief argument in favour of sterilization has been largely removed owing to the reduced maternal mortality in the operation, and that the risk of a second Cæsarean section is probably less than that of the primary one.

Thus in 150 cases of repeated Cæsarean section collected by Polak<sup>58</sup> of Brooklyn, N.Y. (see also Wallace<sup>57</sup>) the mortality was less than 5 per cent., and in the Table of 1,282 cases in the United Kingdom here given, there were 108 cases with 7 deaths, a mortality of 6·4 per cent. (see footnote *a*), a smaller death rate than the average mortality 8·1 per cent of all cases of Cæsarean section in contracted pelvis, done during the last 10 years, and about the same as the 6·1 per cent. mortality of the last 5 years (Table III, p. 47). Only 4 of the children died before leaving the hospital. Ten women had Cæsarean section performed three times (*b*), and one (*c*) four times by Professor Sinclair, all these 11 women surviving.

The following British obstetricians, whether for or against sterilization, hold that the decision as to whether a woman should or should not be sterilized, must ultimately and ethically rest with the patient and her husband after having had the subject put fairly before them:—Barber, Barbour, Berkeley, Stanmore Bishop, Bonney, Cameron, Halliday Croom, Champneys, Edge, Favell, FitzGibbon, Haig Ferguson, Gibson, Giles, Gow, Haultain, Hellier, Herman, E. Holland, Jardine, Jellett, Johnstone, Munro Kerr, Lewers, Lockyer, Maclean, Newnham, John Phillips, Playfair, Purslow, Rayner, Routh, Savage, Mrs. Scharlieb, Darvall Smith, Heywood Smith, Stabb, Stevens, Stookes, F. E. Taylor, Wallace, Walls, Herbert Williamson, Wilson.

Others, like Spencer<sup>59</sup> and Lyle, consider that the patient need not be consulted and that the operator alone should decide, that his surgery should be strictly conservative and that sterilization should only be done when it is involved in the performance of hysterectomy or oöphorectomy for other conditions.

Grimsdale sees no reason to sterilize after Cæsarean section any more than after natural labour, and Gemmell, Hewetson, Lea and Willett (Liverpool) think sterilization is unjustifiable.

At the opposite extreme Buist, Tennison Collins, Duncan, Newn-

(*a*) Up to the end of 1909 there had been 88 cases of repeated Cæsarean section, with 4 deaths, a mortality of 4·5 per cent. Unfortunately three deaths occurred in the first 6 months of 1910 out of 20 cases. The causes of death in these 7 cases were tuberculosis, peritonitis (2), acute intestinal obstruction, shock, pyelo-nephritis and bowel injury.

(*b*) Briggs, Grimsdale, Haultain, Hewetson, Sinclair, Spencer, Wallace (3), Walls.

(*c*) Sir W. Sinclair's 4 Cæsarean sections on the same woman were performed on April 10, 1896, August 22, 1901, June 23, 1903, and August 1, 1907. I am informed that she is again pregnant.

ham, Rayner, Nigel Stark and Swayne consider that it is not justifiable to allow a patient to be subjected to the risk of another pregnancy, and that she should always be sterilized, unless forbidden by the patient or her husband.

### *Desirability.*

As regards the *desirability* apart from the ethics of sterilization, I have endeavoured to place in three groups the views of those who have expressed decided opinions on the subject.

1. Those operators who consider that a patient should be sterilized to avoid the risk of another pregnancy and another Cæsarean section:—Malcolm Black, Buist, Murdoch Cameron, Tennison Collins, Duncan, Lackie, Mansell Moullin, Martin (Sheffield), Newnham, Rayner, Nigel Stark, and Swayne.

This view was very largely held by many obstetricians, including Champneys, Cullingworth and myself, but the diminishing risk of Cæsarean section and the still smaller risk of repeated operation made these and many others change their views.

2. Those who would more or less strongly advise against sterilization, in most cases however, being willing to sterilize if the patient insisted upon it after hearing the pros and cons:—Russell Andrews, Barbour, Beckett-Overy, Berkeley, Stanmore Bishop, Blacker, Blair-Bell, Bonney, Champneys, Croft, Donald, Fairbairn, Favell, Haig Fergusson, Gemmell, Gibson, Gow, Griffith, Grimsdale, Handfield-Jones, Hewetson, Holland, Jardine, Johnstone, Munro Kerr, Lockyer, Lyle, Maclean, Malins, Pearson, Playfair, Purefoy, Lloyd Roberts, Routh, Russell, Savage, Sinclair, Bellingham Smith, Darwall Smith, Spencer, Stabb, Stevens, Stookes, Targett, Tate, Hastings Tweedy, Wallace, Walls, Willett (Liverpool), Williamson, Wilson and others.

3. Amongst these some would sterilize under certain conditions in cases of contracted pelvis:—

(a) Russell Andrews, Barbour, Berkeley, Gow, E. Holland, Russell, Bellingham-Smith, Darwall-Smith, Targett, Tate would be willing to sterilize at the second Cæsarean section, if the child of the first pregnancy were alive and well.

(b) Blacker, Bonney, FitzGibbon, Gibson, Grimsdale, Munro Kerr, Phillips of Sheffield, Stookes, Wallace and Herbert Williamson would prefer not to sterilize till the third Cæsarean section and only then if both the previous children survived.

(c) Targett would sterilize if the pelvic contraction were associated with severe spinal curvature or ankylosis from old hip disease.

Hastings Tweedy considers sterilization "unnecessary and undesirable," unless the patient has organic disease superadded to pelvic contraction.

Beckett-Overy, Maclean and Mrs. Willey consider that the type

and character of the parents, such as imbecility, might be considered by the operator.

(d) Jellett, McCann and Heywood-Smith would prefer to sterilize if the pelvic contraction were so extreme that premature labour could not be induced at a subsequent pregnancy.

The consensus of opinion seems to be that the operator has no right to sterilize a woman without her consent and approval, and on the other hand he should consent to sterilize her if after the situation is fully explained to her, she and her husband demand it. In other words, as Champneys says, "the patient has the ultimate right to choose."

The method of sterilization most in favour is removal of the Fallopian Tubes in whole or part.

1. The tubes may be either simply *ligatured and divided*, a proceeding which Cameron, Munro Kerr, Kynoch and Stookes consider sufficient, but which Horrocks, Griffith (Case 150) and others have shown has not always prevented fertilization.

2.\* Or a loop may be picked up and ligatured and the loop cut away as Gow recommends.

3.\* The whole of both Fallopian Tubes may be removed.

4.\* Removal or division of tubes, sewing peritoneum over the stumps by burying them in the Broad Ligaments.

5.\* Excision of the uterine end of the Fallopian Tubes by an elliptical incision into the uterine cornu and closing the incised muscle by catgut sutures.

6. Crushing the tubes, with or without ligature (Edge).

7.\* Hysterectomy.

8. Removal of the ovaries.

#### *Extra-Peritoneal or Supra-symphysary Cæsarean Section.*

*Historical.* Parvin<sup>68</sup> states that extra-peritoneal section of the uterus, now re-introduced, was proposed by Jorg in 1806 and by Ritgen in 1821. In 1823 Baudelocque described the operation as gastro-elytrotomy and Gaillard Thomas (1870) and Skene (1874) and

2.\* Barber, Barbour, Braithwaite, Buist, Favell, Ferguson, Gow, Grimsdale, Haultain, Hellier, Jardine, Lackie, Lea, Lewers, Maclean, Martin, (Sheffield), Newnham, Phillips (London), Purslow, Rayner, Scharlieb, Stabb, Stark, Taylor, Tweedy, Walls, Williamson.

3.\* Berkeley, Bonney, Collins, Croom, Dodd, Eden, Gibson, Griffith, Herman, Pearson, Scharlieb, Bellingham Smith, Heywood Smith (cautery to uterine end), Stevens, Stookes.

4.\* Andrews, Bell, Blacker, Briggs, Champneys, Croft, Fitzgibbon, Handfield-Jones, Johnstone, Lockyer, Malins, Phillips (Sheffield), Darwall Smith, Swayne, Targett, Tate, Wallace, Wilson.

5.\* Fairbairn, Holland, Jellett, McCann, Playfair, Robinson, Routh, Russell.

7.\* Dakin, Duncan, Giles, Mansell Moullin (if over 40), Mrs. Willey.

8.\* Stanmore Bishop (and tubes), Hewatson.

others in U.S.A. performed it on ten occasions as a substitute for Cæsarean section. Whiteside Hime of Sheffield and Edis of London were the first to perform it in England in 1880.

More recently a large number of operators abroad have been anxious to find some operation which would do away with the necessity for perforating a living child, and be applicable for those marked cases of pelvic contraction unsuitable to pelviotomy or craniotomy, especially in cases supposed to be septic and therefore unsuited to classical Cæsarean section.

It was felt by many that pubiotomy or symphysiotomy, however, suitable for moderate degrees of pelvic contraction when the patient was aseptic, became dangerous to life, or accompanied by enormous morbidity during convalescence if the patient were septic. In addition there are numerous cases with a smaller conjugata vera than  $2\frac{3}{4}$  inches (7 cm.) where pubiotomy is impracticable at term. To avoid therefore the alternatives of craniotomy or Cæsarean hysterectomy they have endeavoured to extract the child without the peritoneal cavity being involved in the operation. It was realized that eventration of the uterus before incision was not sufficient to prevent septic peritonitis in cases where apparently only saprophytic germs were present, and quite useless when virulent streptococci were the cause of the infection.

Some operators endeavour to strip off the peritoneum from the lower uterine segment without opening the peritoneum—true extra-peritoneal Cæsarean section. Others realizing that that is frequently impossible, or if practicable, causes much injury to the peritoneum, prefer to open the peritoneal cavity, and then incise the visceral peritoneum where it is loosely applied—usually at the point of overlapping of bladder and uterus—strip off some of the peritoneum and stitch it temporarily to the parietal peritoneum at the margins of the abdominal wound. This is usually called the trans-peritoneal Cæsarean section.

Any such operation would in infected cases compete mainly with Cæsarean hysterectomy.

Frank<sup>60</sup> of Cologne in 1907, was the first in recent years to advise that for possibly septic cases the uterus should be opened whilst the peritoneal cavity was shut off. The pelvis being raised he made a transverse supra-pubic incision through all the tissues down to the peritoneum. The recti muscles are then widely separated and the retro-pubic cellular tissue opened up. The peritoneum is then stripped from below upwards off the superior surface of the bladder and the anterior wall of the uterus. The child is then extracted through a transverse uterine incision by traction, forceps or version. In septic cases abdominal drainage is employed. Baumm<sup>61</sup> of Breslau, Sellheim<sup>62</sup> and others have modified Frank's technique into a transperitoneal operation. After a modified Pfannenstiel supra-

pubic incision through skin and fat, the fascia and muscles and peritoneum are divided longitudinally along the linea alba. The peritoneum at the point where it passes from the bladder on to the anterior wall of the uterus is then divided transversely, stripped off and turned up, and the flap temporarily united by interrupted sutures to the parietal peritoneum at the upper end of the abdominal incision. If necessary the bladder with its covering of peritoneum can also be stripped off and turned down. The child is then extracted extra-peritoneally through a longitudinal or transverse uterine incision.

Probably the Latzko-Döderlein operation is now the favourite extra-peritoneal Cæsarean section abroad, and this is described by Döderlein as follows:—

“A Pfannenstiel transverse incision is first made followed by separation of the recti with very slight notching of the right rectus at its point of insertion and partial detachment of its base. The bladder is so far filled that its contours are plainly visible, in the way that Sellheim and others have also done, and then the hand is squeezed between the anterior and lateral pelvic wall to the right, so that the loose cellular tissue here is divided, in the same way that the finger divides it in subcutaneous “hebstomy” only more extensively. In doing this there is scarcely any loss of blood so that it is not necessary to do anything to arrest hæmorrhage. By means of this single manipulation such a large piece of the genital tube is exposed that it can be laid open at once. If necessary the right side of the moderately filled bladder is pushed flatly over towards the middle line, and there is then always space to make a large enough longitudinal incision into the lower uterine segment for the extraction of the child. The head which projects at the pelvic inlet pouches the lower uterine segment and the wall of the uterus so far forward that it greatly facilitates the incision. Very great care is necessary in order not to injure the child. An incision is then made at the top of the part that pouches forwards, and is then lengthened by a series of quite short, careful snips with the scissors downwards, taking care not to interfere with the ureter or the large lateral vessels which flow to the uterus. After the child is delivered it will be seen that the incision has been made with its lower end at the boundary of the outer os uteri and at the beginning of the vagina.

Suturing the incised wound is very simple, as the whole of the operation area is well in view in the Trendelenberg position. The uterine wall is stitched with a continuous catgut thread, and covered with the loose connective tissue of the bladder and with the bladder itself by another continuous thread, and the abdominal wall is then closed completely without drainage.”

If infection be suspected, he advises that the cellular tissue

should be drained into the vagina and not through the abdominal wound.

Post-operative complications are, as one would expect, numerous in these extra-peritoneal cases. Jeannin<sup>65</sup> states they occur in 30 per cent. of cases, sepsis being the cause in 25 per cent. The remaining 5 per cent. of morbidity being due to lacerations, fistulæ, hæmaturia, etc. The mortality is from 3 to 5 per cent. In 65 extra-peritoneal operations there were 2 deaths; in 77 trans-peritoneal there were 3 deaths; deaths were mainly due to peritonitis in spite of the fact that the general peritoneal cavity is presumed to be shut off from the operation area.

One or other of these varieties of extra-peritoneal Cæsarean section is considered by their advocates to be indicated in doubtfully septic cases, especially where the conjugata vera is less than  $2\frac{3}{4}$  inches (6.9 cm.), where the case is advanced in labour, the membranes ruptured, the uterus retracted and Bandl's ring present, with a marked expansion of the lower uterine segment. Such probably septic cases are clearly unsuitable for classical Cæsarean section, and most British obstetricians would in such cases do craniotomy or Cæsarean hysterectomy. Hastings Tweedy<sup>5</sup> considers that the possibility of sepsis should not prevent these operations, but in order to lessen the exposure of cellular tissues has proposed a slight modification in technique.

Sellheim,<sup>66</sup> believing that all the above cervical Cæsarean sections are dangerous in infected cases, has more recently advocated the formation of a utero-abdominal fistula in cases of undoubted infection. He does this by opening the abdomen by a longitudinal incision in the linea alba, stitching the parietal peritoneum to the skin, and he also stitches the parietal peritoneum to the uterine peritoneum which is incised longitudinally, and stripped off the line of the intended uterine incision. The bladder is then turned down and the child extracted through a longitudinal uterine incision. The edges of the uterine wound are then stitched to the edges of the abdominal wound, leaving the utero-abdominal fistula open. The fistula, as a rule, rapidly closes or can be made to close by a plastic operation. Veit<sup>67</sup> adopts the technique of the operation so far as shutting off the peritoneal cavity but does not consider the formation of the fistula essential. He either unites the detached peritoneum of the lower segment to the parietal peritoneum by clamps, or stitches the parietal peritoneum on to the uterus temporarily.

It is possible that such an operation may help to save lives in septic cases, and in a recent case of my own (1045) I have no doubt that a utero-abdominal fistula, which accidentally formed, was an important factor in saving the patient's life, primary union of the uterine wound having failed to occur.

Whether extra-peritoneal Cæsarean section will ever take the place of classical Cæsarean section in non-infected cases or whether Sellheim's utero-abdominal fistula operation will be substituted for Cæsarean hysterectomy in infected cases time will show.

As regards infected cases, however, the opinion is steadily gaining ground on the continent that extra- or trans-peritoneal Cæsarean section is a dangerous proceeding. It is obvious that it must be so and the caution of the British obstetrician in refusing to adopt the present indications for the operation and its technique as at present performed is abundantly justified. The disadvantages in infected cases are numerous:—

1. The uterus with its large placental site and decidual surface and its incised wall is retained as a channel for infection;

2. The peritoneum is bruised, and when stripped off from its subserous attachments loses to a very large extent its blood supply, and becomes less resistant to septic processes.

3. The under-surface of the peritoneum thus partially deprived of its blood supply, is during the operation constantly in contact with any septic germs present in utero and this probably explains the fact that many of these cases die of peritonitis;

4. A very large cellular area of connective tissue is exposed to infection;

5. The bladder if detached may become displaced, and if cellulitis occur is apt to be secondarily inflamed and to become adherent in an unsatisfactory position.

Meanwhile it seems clear from the mother's point of view, that in infected cases with a C.V. of under  $2\frac{1}{2}$  inches (5 cm.) hysterectomy should be performed, and that if the C.V. be over that size the operation chosen should be either hysterectomy or craniotomy according to other circumstances in the case.

Seven cases of extra-peritoneal Cæsarean section are given in the tables, 2 performed by Russell (Cases 1222, 1240), one by Savage (969). 1 by Sinclair (1041), and 3 by Hastings Tweedy (1129, 1150, 1168). Six of the mothers recovered. One had a troublesome vesico-abdominal fistula and another a temporary cystitis. Six of the children survived. Three of the cases were "suspect cases."

#### SUMMARY OF CONCLUSIONS.

As a concise *summary*, therefore, in cases of *contracted pelvis* the following would be the usual line of treatment in the United Kingdom:—

1. *If the patient be seen early enough during pregnancy.*

Induction of premature labour at or after the 35th week if the child be living and the head be found to be presenting and not to

be relatively too large. If the pelvis be too small for induction at the 35th week, or if the head be not presenting and external cephalic version prove unsuccessful, await full term with the patient's consent and perform a conservative Cæsarean section.

2. *If the patient be only seen at full term or in labour.*

(a) *Where no attempts have been made to deliver.* Conservative Cæsarean section if the child be alive, with the possible alternative of pubiotomy or symphysiotomy if the head were impacted and apparently only a little more room were needed. At present this alternative course is adopted by very few owing to the large post-operative morbidity.

(b) *Where attempts have been made to deliver or where the membranes are ruptured, frequent examinations have been made, and infection is presumed to be present.* Here the favourite treatment in the hands of experts would be Cæsarean hysterectomy, if the conjugata vera is under  $2\frac{1}{2}$  inches (6.2 cm.) and the child alive, in preference to any variety of extra-peritoneal Cæsarean section. If the conjugata vera is over  $2\frac{1}{2}$  inches (6.2 cm.), the choice would be between Cæsarean hysterectomy and craniotomy. Most obstetricians would prefer craniotomy in "suspect cases" of apparently mild infection, and some variety of hysterectomy if virulent infection were thought to be present. The ultimate decision would sometimes have to be left to the parents who may prefer the extra risk of Cæsarean hysterectomy in the immediate hope of having a living child. In general practice or in the hands of all but gynæcological experts craniotomy would be the definite choice.

Pubiotomy or symphysiotomy, even by the subcutaneous methods, are considered by most operators to be unsuitable in general practice and in cases supposed to be septic, and the same opinion is largely held as regards all varieties of extra-peritoneal Cæsarean section, even as regards Sellheim's utero-abdominal fistula operation, in all of which the uterus is retained as a channel for a general infection, in addition to the tissues opened up by the operations.

#### A 2.

#### *Indications for Cæsarean Section in cases of Fibroids complicating Pregnancy and Labour.*

It is recognized that the large majority of patients whose pregnancies are complicated by fibro-myomata go to full term and are delivered spontaneously without serious difficulty. Even if the fibroid be primarily pelvic, it is almost always drawn up out of the pelvis before or during labour, and if only partially occupying the pelvis, Cullingworth<sup>69</sup> has shewn that it undergoes softening and flattening, "*assouplissement*" as Depaul has called it, and thus gives rise to no real difficulty. Every such patient seen during pregnancy



should, therefore, be encouraged to go to full term, unless pressure symptoms become severe and intractable or unless evidences of degeneration of the fibroid are present. In such cases induction of abortion is now entirely discountenanced, and if an abdominal operation is required, myomectomy should in suitable cases be adopted instead of hysterectomy, so as to give the patient a good chance of going to full term. Labour appears to be induced in 40 per cent. of cases after myomectomy for embedded fibroids, but in only 6 per cent. where the fibroid is pedunculated.

When fibroids are found actually obstructing labour, owing to the fibroid being cervical, or intra-ligamentous, or adherent to the floor of the pelvis or definitely impacted, Cæsarean section will be required, followed by myomectomy if this is practicable, or some variety of hysterectomy. As these proceedings are usually easy of performance at full term, they should be done at once to save a second operation if the operator's skill be adequate, the patients' condition satisfactory and the environment suitable.\*

Myomectomy was first performed during pregnancy in the United Kingdom by Knowsley Thornton<sup>70</sup> of London, in 1879, and Campbell, of Belfast (Case 148), appears to have been the first to successfully perform a myomectomy after Cæsarean section at full term in 1899. Herman performed a successful Cæsarean section with oöphorectomy in 1892 (Case 53).

M. Handfield-Jones in 1885 was the first British obstetrician to perform supra-vaginal hysterectomy with extra-peritoneal treatment of the stump for an obstructing fibroid, whilst Gow in 1896 (Case 120) was the first to treat the uterine stump by the intra-peritoneal method. In 1895 (Case 86a) Sir William Smyly<sup>72</sup> performed a successful vagino-abdominal panhysterectomy following Cæsarean section for a full term pregnancy complicated by fibroids in one horn of a double term. Herbert Spencer,<sup>73</sup> in 1905 (Case 500), was the first to perform an abdominal panhysterectomy for an obstructing fibroid. In the last three of these cases the mothers recovered.

\* *Panhysterectomy v. Sub-total hysterectomy.* Herbert Spencer,<sup>92</sup> who is the chief exponent of panhysterectomy in England, whether the patient be pregnant or not, believes that the complete removal of the uterus is safer, because by it "drainage can be better secured, and concealed hæmorrhage, pelvic exudations and subsequent infection or cancer of the cervix do not occur." He refers to 24 published cases of cancer having occurred in the cervix after sub-total hysterectomy.

Those who disagree with Spencer point to the longer duration of the operation in panhysterectomy and the somewhat greater loss of blood, the interference with the integrity of the pelvic floor, and the shortening of the vagina which may cause dyspareunia. They require further evidence to show that carcinoma of the retained cervix is liable to occur, and they point to the loss of the internal secretion of the glandular cervix if it be removed. Conservative surgery seems to require the retention of the cervix unless it can be shown that its removal adds to the security of the patient. Statistics are not conclusive either way. (See Tables I. and V.)

TABLE I.

*Showing Cases of Fibro-mymata complicating Pregnancy and Labour treated by Cæsarean Section and Hysterectomy.*

| Treatment  | Number of Cases | Deaths. |             |           |             |
|--|-----------------|---------|-------------|-----------|-------------|
|  |                 | Mother  | Per-centage | Chil-dren | Per-centage |
| Cæsarean Section - - -   | 20              | 6       | 30·0        | 4         | 20·0        |
| Cæsarean Section + oöphorectomy  | 3               | 2       | 66·6        | 2         | 66·6        |
| Cæsarean Section + myomectomy -  | 5               | 0       | 0           | 0         | 0·0         |
| C.S. followed by supra-vaginal hysterectomy with extra-peritoneal treatment of stump - | 7               | 1       | 14·3        | 1         | 14·3        |
| C.S. followed by supra-vaginal hysterectomy with intra-peritoneal treatment of stump - | 26              | 4       | 15·4        | 4         | 15·4        |
| C.S. followed by panhysterectomy   | 13              | 1       | 7·7         | 5         | 37·7        |
| Total - - -  | 74              | 12      | 16·5        | 14        | 18·9        |

## A 3.

*Cæsarean Section in cases of Cancer of Genital Passages.*

A. *Patients seen early in pregnancy with operable cancer of the cervix* should be treated by panhysterectomy by the abdominal (Wertheim) operation, or by the vaginal route (Dührssen) as appears advisable, the uterus being emptied first, after cervical incisions if need be in the latter case.

B. *Patients seen early in pregnancy with inoperable cancer of the cervix or vagina* may be allowed to go to nearly full term and then be delivered by Cæsarean section or Cæsarean hysterectomy (see D).

C. *Patients seen at or near full term with operable cancer of the cervix* should be treated by abdominal Cæsarean section followed by panhysterectomy. Panhysterectomy following Cæsarean section can be done in such cases, as Munro Kerr says, by four methods:—

1. Abdominal panhysterectomy by Wertheim's method, using especially his vaginal clamps, to prevent peritoneal infection. One such case by Micholitsch lived over 5 years without recurrence.

2. *Zweifel's method.* Removal of body of uterus by the abdo-

minimal route by supra-vaginal amputation, and removal of the cervix by the vagina. (See MUNRO Kerr's case 396.)

3. *Olshausen's method.* Removal of the whole organ by the vagina after tying off the ovarian and uterine vessels and other connections by the abdomen (Munro Kerr, Case 469).

4. *Vaginal Cæsarean section followed by vaginal hysterectomy* is advocated by Dührssen, Bumm, and Orthmann, and the latter has collected 29 cases with 5 deaths (17 per cent.). This is not an operation at all favoured in the United Kingdom.

Herbert Spencer,<sup>76</sup> who is strongly against vaginal Cæsarean section, advised in 1904 that in *early cases of squamous epithelioma* where the cervix is well dilated and labour advanced, instead of doing either vaginal or abdominal Cæsarean section, the child should be delivered by the natural passages and the uterus removed immediately by the vagina by means of the galvano-cautery.

He described three such cases where he had removed the cervix during the puerperium by the high vaginal amputation with the galvano-cautery leaving the body of the uterus intact. The patients remained free from recurrence 11, 8½ and 8 years after operation, and these cases together with one case by Dmitri de Ott, another by Olshausen and a third by Micholitsch, six cases in all, constitute all the cases of cancer complicating pregnancy which have lived for over 5 years from the date of operation without recurrence.

All these cases, except Micholitsch's which was a Wertheim, were delivered by the vagina and operated upon *during the puerperium* (one as long as 5 months after delivery).

It is difficult to explain these excellent results by a method which is now considered to be more or less obsolete, for Spencer and most other operators would now in such cases prefer abdominal Cæsarean section followed by the extended Wertheim abdominal hysterectomy, except where labour is far advanced.

D. *Patients seen at or near full term with inoperable cancer of the cervix* may be delivered by Cæsarean section\* by the classical method, taking particular pains to apply accurately the superficial peritoneal suture to cover in completely the uterine wound and the suture knots. This, however, leaves the uterus, and especially the placental site, liable to be infected by the septic cervix, so that many prefer to follow the Cæsarean section by sub-total hysterectomy. If so, one of two methods must be employed:—

1. *Abdominal supra-vaginal hysterectomy with extra-peritoneal treatment of the stump.* This has been advocated by Spencer but may be dangerous owing to the possible traction on the friable carcinomatous tissues of the supra-vaginal cervix. If in order to avoid such traction amputation of the uterus is performed high up, the danger of infection is still present.

2. *Abdominal supra-vaginal hysterectomy with intra-peritoneal treatment of the stump.* This is advised by Munro Kerr.

In the cases collected by me there have been 33 cases of cancer of the cervix treated by Cæsarean section. Thirteen of these were operable and were further treated by panhysterectomy, mostly by Wertheim's method with three maternal deaths, nine children being saved. One case (Munro Kerr, 396) was by a vagino-abdominal operation (see also Case 469). In addition to these, Gemmell successfully performed vaginal Cæsarean section and vaginal hysterectomy in another case. Of the remaining 20 inoperable cases 12 were treated by simple Cæsarean section with 4 deaths, 10 children surviving; 3 by supra-vaginal hysterectomy with extra-peritoneal treatment of the stump, all the mothers and children surviving; 5 by supra-vaginal hysterectomy with intra-peritoneal treatment of the stump, 4 of the mothers and 4 of the children surviving.

The high mortality of the "inoperable" cases of cancer treated by Cæsarean section only is partly explained by the fact that several were moribund or so weak that the further ordeal of supra-vaginal hysterectomy was thought unjustifiable.

TABLE II.

*Cases of Cancer of the Cervix treated by Cæsarean Section and Hysterectomy.*

|  | Cases | Maternal Deaths |             | Fœtal Deaths |             |
|--|-------|-----------------|-------------|--------------|-------------|
|  |       | Num-ber         | Per-centage | Num-ber      | Per-centage |
| Cæsarean Section only* - -   | 12    | 4               | 33·3        | 2            | 16·6        |
| Cæsarean Section and supra-vaginal hysterectomy with extra-peritoneal treatment of the stump - | 3     | 0               | 0·0         | 0            | 0·0         |
| Cæsarean Section and supra-vaginal hysterectomy with intra-peritoneal treatment of the stump - | 5     | 1               | 20·0        | 1            | 20·0        |
| Cæsarean Section and abdominal panhysterectomy - - -   | 12    | 3               | 25·0        | 3            | 25·0        |
| Cæsarean Section and vaginal panhysterectomy - - -   | 1     | 0               | 0·0         | 0            | 0·0         |
| Total - - - -  | 33    | 8               | 24·2        | 6            | 18·1        |

\* These 4 deaths occurred out of 5 cases (2, 24, 188, 221, 256) thus operated upon before 1902. The 7 cases operated upon since that date recovered from the operation.

## A 4.

*Cæsarean Section for Ovarian Tumour.*

Ovarian tumours are said to complicate pregnancy with a frequency of 1 in 1,500 (Munro Kerr<sup>77</sup>) or 1 in 891 (Fehling).

McKerron<sup>78</sup> collected 862 cases and the nature of the tumours were—dermoid cysts 23 per cent., other cysts 68 per cent., malignant tumours 5 per cent., fibromata 2 per cent. He states that torsion occurs in 12 per cent. during pregnancy, and 20 per cent. during the puerperium, as compared with 8 per cent. in cases uncomplicated by pregnancy. He finds that rupture of an ovarian cyst during labour occurs in 13 per cent.

These statistics show the frequency and risks of the complication.

The question which in this paper one has to consider is whether there is a place for Cæsarean section in such cases.

1. *Ovarian tumours discovered during pregnancy.*

These should be removed to prevent the risks of pressure upon the pregnant uterus and of torsion of the pedicle and possible rupture of the cyst. Small pelvic tumours can be easily and safely removed by the vagina. In five cases of vaginal ovariectomy which I have performed during early pregnancy only one ended in abortion. Abdominal tumours, or tumours only partially pelvic should be removed by the abdomen. The mortality of abdominal ovariectomy during pregnancy is about 3·3 per cent. (McKerron), and the same author states that labour is induced by the operation in 16 per cent. in the first half and 34 per cent. in the later months of pregnancy.

2. *Ovarian tumours discovered shortly before or during labour.*

(a) If the tumour be abdominal and not so large as to interfere with respiration, it may be left till after labour and removed during the puerperium, or even later if the patient can be kept under observation in case torsion should occur. If, however, removal of such a cyst be required during labour, delivery should be left to nature or may be facilitated by forceps by an assistant if the parts are sufficiently dilated, whilst the patient is still under anæsthesia.

(b) *If the patient be in labour and the tumour be in the pelvis.*

Delivery by forceps, version or craniotomy past an obstructing body is very dangerous to the mother, as Braxton Hicks long since proved.

Attempts may be made to displace the pelvic tumour upwards per vaginam or rectum under deep anæsthesia in the Sims', genu-pectoral or Trendelenburg position. If this fail, the cyst should be removed either by the vaginal or abdominal route. In some cases where vaginal ovariectomy for a small cyst is being attempted labour might come on so rapidly that the pedicle could not be secured after the cyst contents (simple or dermoid) had been expelled.

In such a case a stout silk ligature should be tied to the cyst and the vaginal wound temporarily closed. After labour is over the vaginal wound should be re-opened, the cyst drawn down out of the pouch of Douglas, its pedicle secured and replaced and the vaginal wall firmly sutured. Most obstetricians, however, would prefer to remove the cyst by the abdomen, as Sir John Williams and Spencer<sup>79</sup> have done, allowing labour to proceed as stated above (2 a). Haultain, on the other hand, prefers to deliver the child by Cæsarean section before removing the cyst, but cases where a pelvic ovarian tumour, even when adherent, cannot be drawn up out of the pelvis if the uterus be turned out of the abdomen, must be relatively very rare.

As a matter of routine, therefore, there is only a place for Cæsarean section under the following exceptional circumstances:—

(a) Where the tumour though pelvic is solid and cannot therefore be dealt with by vaginal incision, and is also too large or fixed to be pushed out of the pelvis, and where during the subsequent cœliotomy, the pelvic tumour cannot be lifted out of the pelvis, even if the pregnant uterus be turned out of the abdomen.

(b) Where cœliotomy has been performed to remove an adherent pelvic or broad ligament cyst and it is found impracticable to separate the adhesions or enucleate the cyst without first reducing the size of the uterus by Cæsarean section.

(c) Where after ovariectomy during labour the patient is found to be also suffering from some serious constitutional disease or pelvic abnormality which renders delivery *per vias naturales* undesirable.

(d) Where owing to unusual rigidity or undilatability of the soft parts, as might for instance occur in an elderly primigravida, it is thought wise not to let the abdominal wound run the risk of injury by the prolonged strain of a tedious labour, and where instrumental labour is considered to be impracticable or undesirable.

Such conditions as these are rare, but the 28 cases,\* 26 of which were pelvic, recorded in the table of cases, show they are met with. Twenty-six of these cases recovered from the operation, the two deaths being one where the pelvis was blocked by a malignant ovarian tumour, and the other by a solid tumour, both being dealt with by supra-vaginal hysterectomy with intra-peritoneal treatment of the stump (Cases 771 and 934). Eleven of the 26 pelvic tumours were dermoids, 2 were malignant, 3 solid, and there was also a parovarian cyst.

\* Barber (538), Boxall (114), Braithwaite (125, 144), Croft (1204), Favell (203, 819), Ferguson (1020), Haultain (290, 1207), Jardine (626), Kerr (771), Lewers (888), Lyle (1120), Martin (934), Pearson (1146), Purslow (563), Scharlieb (482), Sinclair (163, 215, 529), Spencer (381), (thought to be a uterine tumour), Stevens (1006, 1116), Swayne (348), Targett (1017), Wallace (628).

## A 5.

*Cæsarean Section for other Pelvic Tumours.*

Such tumours are mostly fixed and malignant growths of rectum or bladder or urethra, or enchondromata, osteomata and osteo-sarcomata growing mainly from the pelvic joints, and if in any sense obstructive can only be dealt with by Cæsarean section and by the appropriate treatment for the growth itself.

Munro Kerr<sup>80</sup> and Blacker<sup>81</sup> allude to cases of *vesical calculus* in the practice of Smellie, Hugenberger and others.

In the cases here collected there are 8\* cases of cancer of the rectum with 3 deaths (Cases 141, 599, 711), and there were also 3 enchondromata, 5 osteo-sarcomata, 6 obstructing exostoses, and 1 subperitoneal growths, 15 cases in all,† with 3 deaths (Cases 35, 68, 724) (see Table VI. at end).

Eden (851) and Gow (842) describe two cases of undefined cancer in the pelvis requiring C.S.

There are also five cases of obstruction due to the retroflexion or enlargement of a *second horn of a bicornute uterus* (Cameron (250), Clifford (634), Favell (949), Lyle (412), Playfair (644), the last patient dying of septicæmia.

Blacker has a remarkable case of *calcified hydatid cyst* obstructing labour (116).

## A 6

*Cæsarean Section for cervical and vaginal stenosis.*

Excluding cases due to carcinoma of the cervix already discussed these stenoses are mainly cicatricial, the result of injuries received during a previous confinement. One among the cases collected followed the amputation of a cancerous cervix two years previously (Spencer, 98) and one was for a very small vagina in a nullipara aged 44 (Grimsdale, 927).

In the cases collected by me there are 8 cases‡ of cervical and vaginal stenosis without any mortality. Of these five had Cæsarean section alone performed, and three sub-total hysterectomy, one (Spencer) with extra-peritoneal, and two (Herman and Routh) with intra-peritoneal treatment of the stump.

\* Barber (747), Duncan (119), Ferguson (599), Griffith (141), Grimsdale (134), Johnston (711), Robinson (328), Williamson (881).

† *Enchondromata*: Briggs (720), Collins (373), Stookes (1127).

*Osteo-Sarcomata*: Champneys (137), Herman (35), Lyle (746), Maclean (724), Spencer (68).

*Exostoses*: Barber (431), Dakin (278), Donald (154), Fitzgerald (593), Herman (310), Rayner (1019).

*Subperitoneal Tumours*: Champneys (225).

‡ Blacker (1108), Favell (553), Gow (812), Grimsdale (927), Herman (244), Hewetson (1087), Routh (748), Spencer (98).

## A 7.

*Miscellaneous Group.*

Amongst this group there are 7 cases (see Table VI at end of paper) of *previous ventrifixation* causing dystocia occurring in the practice of Cameron (971, 1137), Jardine (950), Munro Kerr (1217), Lyle (1253), Spencer (323) and Targett (691). Spencer's case was due to a previous myomectomy with extra-peritoneal treatment of the stump of the fibroid. One of these died (1253). Neither Lyle, Spencer nor Targett sterilized their patients.

*Tonic contraction of the uterus* required Cæsarean section in 8 cases, with 4 maternal and 7 foetal deaths, Collins (1042), Edge (1101), Fothergill (906 and 945), Gow (857), John Phillips (211 and 227). All the children died. Rupture of the uterus appeared imminent in most of the cases and in some the pelvis was also contracted. In Phillips' two cases the presenting shoulder was so impacted in the pelvis that the children could not be delivered after Cæsarean section till they had been eviscerated. Both mothers recovered. Tenison Collins performed C.S. to save the child on a woman with a prominent sacrum and an impacted mento-posterior presentation (Case 548).

Champneys (Case 468) also had to perform Cæsarean section in a remarkable case of *Hour-glass contraction of the uterus* in the first stage of labour. No other abnormality of mother or child was present. Forceps had previously failed to deliver.

There are also 4 cases of *missed labour* or *prolonged gestation*. In Buist's case (1000) gestation was supposed to be 11 months advanced, the child was anencephalic and weighed 10 lbs. Version had been attempted. The woman recovered. In Mrs. Scharlieb's case (94) the os uteri was occluded, and the uterus gangrenous, making panhysterectomy the only chance. Cameron's case (250) was supposed to be 12 months pregnant, and at the operation the macerated foetus was found in the right half of a uterus duplex.

Horne of Dublin (704) had a case of convulsions due to spinal meningitis, but he was unable to save either mother or child.

## B. CÆSAREAN SECTION FOR UTERINE HÆMORRHAGE.

1. *Concealed Accidental Hæmorrhage.*

Every one has met with cases of this dangerous complication of labour where an inert uterus is distended with blood before the child is born, and where when the child is delivered and the uterus emptied a further post partum hæmorrhage occurs and the patient dies.

When the uterus is tense and tender and cannot be made to contract, and the concealed hæmorrhage is increasing, and the patient is becoming more collapsed and bloodless, it is justifiable to



perform Cæsarean section in the interests of the mother, even though it is almost certain the child is dead. In such a case hysterectomy should be performed at once as inertia uteri is present. Abdominal supra-vaginal amputation of the uterus with intra-peritoneal treatment of the stump is probably here the best form of hysterectomy, though extra-peritoneal treatment of the stump would be the quicker if urgency were extreme.

Vaginal Cæsarean section followed by vaginal hysterectomy is not approved of, for although the child being dead can be removed easily through the first cervical incisions after perforating the head, and the full-term emptied uterus can be easily removed at full term in a multipara, the actual operation takes a longer time and requires more skill and special instruments than by the abdominal route. Hæmorrhage, too, from the emptied uterus, pending its removal, is so much more under control by the abdominal route by clamping the ovarian and uterine vessels, that the latter route is preferable. The opportunity too is simultaneously afforded during the latter operation of filling the abdomen by hot saline to reduce the existing collapse.

In the collected cases, abdominal Cæsarean section for this condition has been done 4 times (Bagot 29, Briggs 80, Savage 1230, Targett 455). The two cases which died were moribund at the time of operation, but those operated on by Bagot in 1891, and Targett in 1904, were in better condition and survived. In three cases Cæsarean section was followed by supra-vaginal hysterectomy, two with external, one with intra-peritoneal treatment of the stump. The 4th was too ill to do more than Cæsarean section.

## B 2.

### *Cæsarean Section in Placenta Prævia.*

*Abdominal Cæsarean Section* for this condition as first advocated by Lawson Tait in 1890 stands on an entirely different footing to that treatment for concealed accidental hæmorrhage: and very few, if any, operators advocate it, except for special and rare complications.

*Vaginal Cæsarean Section* in cases of placenta prævia, is almost universally condemned, yet Savage, of Birmingham, has performed it in four cases, and Edge of Wolverhampton in 2 cases, all successfully. The best European results are those of Bumm who had 1 death in 15 cases. Vaginal incision sufficient to allow the insertion of two fingers to enable podalic version to be performed is advised by some. The risk of further laceration during subsequent delivery is obvious even if the incision be sutured.

At a discussion upon a paper on the subject, read before the Royal Society of Medicine by Dr. Jellett,<sup>82</sup> of Dublin, the President, Dr. Macnaughton-Jones, Drs. Champneys, Spencer, Purslow, Grif-

fith, Gow and myself agreed with the opinion of the author of the paper, that as a routine treatment of placenta prævia there was no place for Cæsarean section.

Dr. Jellett showed that in the Rotunda Hospital and in America, in expert hands, the mortality of placenta prævia was only 3 to 3·5 per cent., and in the Clinics of Pinard, Kronig and Dmitri de Ott the mortality was as low as 2·18, 2·1 and 2·5 respectively. The opinion held by the author and most of the speakers was that the only condition for which abdominal Cæsarean section was indicated was where, especially in cases of central placenta prævia, the cervix was so rigid and undilatable that the treatment by bi-polar version, as first suggested by Braxton Hicks, was impossible. The author of the paper showed that this rigidity was rare and certainly did not occur in more than 5 per cent. of all cases of placenta prævia.

It was, however, pointed out that in cases of placenta prævia centralis, hæmorrhage usually took place early, before foetal viability and that if the child survived after Cæsarean section it was usually puny and undeveloped. Any operation therefore in such an early case, to save the child at an increased risk to the mother is unjustifiable.

Statistics of abdominal Cæsarean section in placenta prævia were given by the President and the author of the paper. In America there had been 43 such operations for placenta prævia with a mortality of 7 mothers or 16·3 per cent.; Kronig and Sellheim had no mortality in 26 cases, and all the children survived.

In the cases here collected abdominal Cæsarean section was performed seven times in cases of placenta prævia, Gow (1228), Griffith (480), Munro Kerr (1100), Rayner (1156), Nigel Stark (1259), Walls (127), and Williamson (849). Walls performed Cæsarean section to save the child as the patient was dying. The other 6 mothers and 3 of the children survived.

The conclusion seems to be that in cases where there is a rigid undilatable cervix, where free hæmorrhage occurs on any manipulation pointing to placenta prævia centralis, where the mother is not collapsed and the child alive and nearly at full term, it may be right to attempt to save both mother and child by abdominal Cæsarean section, but that there is no place for Cæsarean section in the treatment of placenta prævia in other than these very exceptional cases.

### C. CÆSAREAN SECTION FOR CONSTITUTIONAL CRISES.

#### 1. *Cæsarean Section in Eclampsia Gravidarum.*

Van der Akker in 1875 was the first to perform successfully abdominal Cæsarean section for eclampsia. Since then the operation has often been performed. In 1897 Kettlitz collected 28 cases with 14 deaths. In 1899 Hillman<sup>83</sup> collected 40 cases with 21 deaths, and Streickeisen,<sup>84</sup> in 1903, added 26 cases with 8 deaths.

In the list of cases collected for the purposes of this paper, there have been 10 cases with 6 deaths. Olshausen reports three Cæsarean sections in 250 cases of eclampsia with 1 death. Thus in 105 cases treated by abdominal Cæsarean section, the deaths were 50, a mortality of 47·6 per cent.

At a discussion on the subject at the Royal Society of Medicine in May 1910, the author of the paper, Dr. F. J. McCann<sup>86</sup> expressed the opinion that there is a distinct place for abdominal Cæsarean section when the fits are severe and rapidly recurring, the patient not in labour and the cervix undilatable; or when the mother is moribund and the fœtus living; or where delivery *per vias naturales* is for some reason impracticable.

If the theory be correct that eclampsia is an auto-toxæmia due directly or indirectly to altered metabolism in the fœtus or placenta, it is only reasonable to assume that emptying the uterus will prevent further toxins entering the woman's circulation. All clinical experience tends in the same direction, and as Dr. McCann postulated in his paper it is probable "that the termination of pregnancy exerts a more powerful and constant influence on the course of the disease than any method of treatment yet employed." In 1902 Herman<sup>87</sup> collected 2,142 cases of puerperal eclampsia, amongst which fits ceased after delivery in 905 and continued in 816. Dührssen and Zweifel state that improvement is greater after artificial than after spontaneous delivery. This latter view is stoutly combated by Herman and to some extent by Spencer.

If it be true that spontaneous or artificial delivery is beneficial to the patient, and if in a given case it is desired to empty the uterus with a rigid undilatable cervix, it is probable that the most rapid and least injurious and disturbing method—at all events in a hospital—would be by abdominal Cæsarean section.

Vaginal Cæsarean section for eclampsia was discountenanced by most speakers, but I have ascertained that it would be considered as a possible alternative to other methods of rapid vaginal delivery (*e.g.*, Bossi's dilator) by the following:—

Barbour, *Blair Bell*, *Bonney*, *Ferguson*, Gibson, Griffith, Halliday Croom, Hellier, Holland, *Kerr*, *Lea*, Lockyer, McCann, Malins, Phillips, Playfair, Rayner, Savage, Darwall Smith, Walls and Wilson. Those whose names are in italics, and probably some of the others also, would only perform vaginal Cæsarean section before the 7th month of gestation.

I can only find 15 cases of vaginal Cæsarean section performed by British operators for eclampsia, with a maternal mortality of 7, 4 children being saved. These operations were performed by Halliday Croom, Edge, Haig Ferguson, Gibson, Griffith, Grimsdale, Munro Kerr, Savage and Walls (see p. 45).

Speaking generally, therefore, the view held appears to be that Dührssen and Bumm's advice to empty the uterus by abdominal or

vaginal Cæsarean section "after the first fit" is not justified and should not be adopted, for 75 per cent. recover without such operations. If, however, the patient is steadily getting worse and the cervix is undilatable, abdominal Cæsarean section is a justifiable method of endeavouring to save the patient's life.

A case of Sir William Smyly's (1254) is recorded in the collected cases bearing out this view. The patient had her first fit on May 15. The fits rapidly recurred, but under morphia, free purgation, and a milk diet, they ceased for a few days, though her general condition was bad. Convulsions recurred on May 21, and as a last chance Sir W. Smyly performed abdominal Cæsarean section, the patient being then semi-conscious, and the fits at once ceased, the woman recovering. The child was born alive but had convulsions till it died 60 hours after birth.

## C 2.

*Miscellaneous Group of Constitutional conditions (Table VI).*

Cæsarean section was required in the collected cases for such conditions as Advanced Heart Disease (Grimsdale, 523), Maniacal Chorea (Blair Bell, 589), General Anasarca involving especially the genital outlet (Lyle, 1201), Myasthenia gravis (Gemmell, 454).

## VAGINAL CÆSAREAN SECTION.

This operation was first described by Dürhssen<sup>89</sup> in 1895 and has been since then perfected by him and is now advocated also by Bumm, Veit, Kronig, Olshausen and others. The operation is of course contra-indicated for cases of marked pelvic contraction where abdominal Cæsarean section is more or less absolutely indicated, and is practically only useful when delivery is impossible at the time required owing to obstruction from the mother's soft parts. It is now extensively practised abroad but is not viewed with favour by the majority of British operators, except in the first three or four months of pregnancy, when in a few rare cases of rigid cervix a moderate anterior-cervical incision may be needed to empty the uterus in cases of missed or incomplete abortion.

Such incisions ought not to be included under the term "Vaginal Cæsarean Section" which is loosely applied by some to incisions through the cervix in all cases where the woman is pregnant. "Abdominal Cæsarean Section" is not so called unless the child is viable, for in the earlier months the uterus would be removed entire without previous incision. There ought to be some period of pregnancy after which the name "Vaginal Cæsarean Section" would be solely applied, some name like "Vaginal hysterotomy" being reserved for the first two or three months.

In the United Kingdom cervical incisions have sometimes been made in cases of carcinoma of the cervix to enable the uterus to be emptied, as a preliminary to vaginal hysterectomy in operable cases at all periods of gestation, but vaginal Cæsarean section between the 13th and 28th week of gestation has been mainly performed

where rapid delivery is considered to be required in grave crises, such as in cases of eclampsia gravidarum where delivery *per vias naturales* is impossible owing to rigidity or disease preventing dilatation of the cervix. Very few operators consider vaginal Cæsarean section justifiable under any circumstances at full term or even after fœtal viability.

The classical abdominal Cæsarean section is in such cases preferred because the actual operation takes less time,\* and is less difficult at or near full term; because it avoids the point of obstruction, the rigid or malignant cervix, and cuts through healthy tissue only, leaving an ideal surgical wound, which is less likely to become infected than in the vaginal operation; and because the post-operative morbidity is far less than after vaginal Cæsarean section.

Vaginal Cæsarean section is condemned more or less strongly by Russell Andrews, Stanmore Bishop, Blacker, Champneys, Donald, Eden, Fothergill, Giles, Herman, Munro Kerr (after 6th month), Lewers, Mansell Moullin, Purefoy, Routh, Mrs. Scharlieb, Spencer, Tate, Taylor. Many others, though not entirely against the operation, do not recommend its adoption.

A. Amongst those who have performed vaginal Cæsarean section (omitting cervical incisions for emptying the uterus in the early months) may be named:—

*Statistics of the above cases of vaginal Cæsarean section.*

| Indications.   | No. of Cases | Maternal Deaths |
|--|--------------|-----------------|
| For Eclampsia: Croom (4), Edge, Ferguson (2), Gibson (2), Griffith, Grimsdale, Kerr (2), Savage (2), Walls (several) - - - - - | 15 +         | 7               |
| For Concealed Accidental Hæmorrhage: McCann, Briggs, Edge (3), Gibson, Phillips (Sheffield) - -                                | 7            | 3               |
| For Placenta Prævia: Edge (2), Savage (4) - - -  | 6            | 0               |
| For Hyperemesis Gravidarum: Ferguson (2) - -   | 2            | 1               |
| For Stenosis of Cervix: Briggs, Brewis, Ferguson -   | 3            | 0               |
| For Carcinoma of Cervix: Gemmell, Savage, Wilson (2)   | 4            | 0               |
| For Heart Disease: McCann, Ferguson (2), Johnstone   | 4            | 1               |
| For Advanced Sepsis and Sloughing of Bladder: Hastings Tweedy (2) - - - - -  | 2            | 2               |
|  | 43           | 14              |

\* By painting the abdomen with a 2 per cent. solution of iodine in rectified spirit widely round the site of the intended incision, the delay in preparing the patient is greatly obviated (H. F. Waterhouse, *B.M.J.*, 1910, Vol. ii, p. 61).

The following are operators who consider that vaginal Cæsarean section may be occasionally employed for special indications, or generally where rapid delivery is required with an undilated cervix in preference to forcible dilatation by Bossi's dilator. *The large majority of these, however, prefer to do abdominal Cæsarean section at or near full term.*

*General indication as above.* Blair Bell, Brewis, Briggs, Griffith, Hewetson, Jardine, Handfield-Jones, Kynoch, Lackie, Savage, Stabb, Swayne, Williamson.

*In Eclampsia.* Barbour, Bonney, Brewis, Croom, Edge, Gibson, Grimsdale, Hellier, Hewetson, Holland, Lea, Lockyer, Malins, McCann, Munro Kerr, Phillips (London), Playfair, Rayner, Savage, Darwall Smith, Walls, Wilson.

*Accidental Hæmorrhage.* Barbour, Edge, Gibson, Hewetson, McCann, Phillips (Sheffield), Rayner.

*Placenta Prævia.* Edge, Hewetson, Lea, Russell, Savage, Wilson.

*Vomiting of Pregnancy.* Kynoch, Savage.

*Carcinoma of Cervix.* Gemmell, Malins.

*Heart Disease.* Brewis, Ferguson, Hewetson, Johnstone, Kynoch, McCann.

*Stenosis or extreme rigidity of Cervix.* Brewis, Briggs, FitzGibbon, Kynoch, Lackie, Savage, Stabb.

*Some infected cases.* Hastings Tweedy, Haultain.

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## STATISTICS.

(See Table III.)

The cases collected (1282) represent the complete consecutive list of all cases of Cæsarean section operated upon for all sorts of indications in Great Britain and Ireland by obstetricians and gynæcologists living on June 1, 1910.

Of the 1282 Cæsarean section operations performed up to June 30, 1910, 1254 have been operated upon for all conditions since 1890 with a mortality of 145 or 11·6%.

During the last uncompleted 5 years (Jan. 1, 1906—June 30, 1910) 711 cases of Cæsarean section have been here performed with 58 deaths, or 8·1%, and this may roughly be considered to be the present death rate of Cæsarean section for *all indications* in the United Kingdom. The death rate for cases of contracted pelvis during last 5 years will be seen to be 6·1%, and Table IV. shows that the death rate of "favourable" cases of Cæsarean section (469 in all), is only 2·9%.

TABLE III.

*Percentages of Mortality before 1891 and during periods of five years from 1891-1910 for Cæsa performed for all indications.*

| Before 1891 |                 |       | Jan. 1, 1891, to Dec. 31, 1895 |                 |       | Jan. 1, 1896, to Dec. 31, 1900 |                 |       | Jan. 1, 1901, to Dec. 31, 1905 |                 |      | Jan. 1, 1906, to June 30, 1910 |                 |       | Cases | M |
|-------------|-----------------|-------|--------------------------------|-----------------|-------|--------------------------------|-----------------|-------|--------------------------------|-----------------|------|--------------------------------|-----------------|-------|-------|---|
| Cases       | Maternal Deaths | %     | Cases                          | Maternal Deaths | %     | Cases                          | Maternal Deaths | %     | Cases                          | Maternal Deaths | %    | Cases                          | Maternal Deaths | %     |       |   |
| 26          | 8               | 30.7  | 62                             | 14              | 22.5  | 65                             | 7               | 10.7  | 303                            | 37              | 12.2 | 602                            | 37              | 6.1   | 1058  |   |
| ...         | ...             | ...   | 8                              | 3               | 37.5  | 11                             | 3               | 27.2  | 23                             | 5               | 21.7 | 32                             | 3               | 9.3   | 74    |   |
| 2           | 2               | 100.0 | 4                              | 1               | 25.0  | 2                              | 0               | 0.0   | 13                             | 4               | 30.7 | 12                             | 1               | 8.3   | 33    |   |
| ...         | ...             | ...   | ...                            | ...             | ...   | 4                              | 0               | 0.0   | 9                              | 0               | 0.0  | 15                             | 2               | 13.3  | 28    |   |
| ...         | ...             | ...   | 1                              | 0               | 0.0   | ...                            | ...             | ...   | 2                              | 0               | 0.0  | 5                              | 0               | 0.0   | 8     |   |
| ...         | ...             | ...   | 2                              | 1               | 50.0  | ...                            | ...             | ...   | 1                              | 0               | 0.0  | 1                              | 1               | 100.0 | 4     |   |
| ...         | ...             | ...   | ...                            | ...             | ...   | 1                              | 1               | 100.0 | 1                              | 0               | 0.0  | 5                              | 0               | 0.0   | 7     |   |
| ...         | ...             | ...   | 1                              | 1               | 100.0 | 2                              | 2               | 100.0 | 2                              | 1               | 50.0 | 5                              | 2               | 40.0  | 10    |   |
| ...         | ...             | ...   | 5                              | 3               | 60.0  | 6                              | 1               | 16.6  | 15                             | 3               | 20.0 | 34                             | 12              | 35.3  | 60    |   |
| 28          | 10              | 35.7  | 83                             | 23              | 27.7  | 91                             | 14              | 15.3  | 369                            | 50              | 13.5 | 711                            | 58              | 8.1   | 1282  |   |

See also Table VI for Cæsarean Section for Miscellaneous Indications.

*Cæsarean section for Contracted Pelvis.* (Tables III, IV.)

Details of 1058 cases of contraction of the bony pelvis are given in the Tables. These include, 4 cases of osteomalachia (Cases 21, 604, 742, 751) and 8 cases of achondroplasia (Cases 79, 128, 356, 535, 592, 651, 1007, 1270).

Before 1891 obstetricians who are now living only performed Cæsarean section for pelvic contraction 26 times with a mortality of 8=30·7%.

Between 1891 and 1900 (ten years) the operation was performed 127 times with 21 deaths, a mortality of 16·5%.

Between 1901 and 1910 Cæsarean section has been done 905 times for this condition with 74 deaths or 8·1%.

During the last uncompleted 5 years, 1906—1910, Cæsarean section has been performed for contracted pelvis 602 times with 37 deaths=6·1%, and this may be taken as the present mortality for Cæsarean section and its modification in Great Britain in cases of contracted pelvis. In favourable cases (see Table IV) the mortality was 2·9%.

Of the 1058 cases of contracted pelvis in the Tables sufficient details are given in 699 cases to draw up the following table:—

TABLE IV.

*Table showing the mortality of Cæsarean operations for contracted Pelvis where details are given, as to possible Infectivity (1891 to 1910).*

| Condition.  | Cases | Maternal Deaths | Percentage |
|---|-------|-----------------|------------|
| A. "Not in labour" * - - -                          | 245   | 9               | 3·6        |
| B. In labour, membrane unruptured - - -             | 224   | 5               | 2·2        |
| C. In labour, membrane ruptured                     | 166   | 18              | 10·8       |
| D. Frequent examinations, or attempts at delivery - | 64    | 22              | 34·3       |
|   | 469   | 14              | 2·9        |
|   | 230†  | 40              | 17·3       |

\* "Membranes intact," or "onset of labour," or "in labour but in hospital some days."

† In the combined groups C and D, out of the 230 cases of possible infectivity, 216 were treated by Cæsarean section alone, with 40 deaths, a mortality of 18·5 per cent. In group D, 58 cases were treated by Cæsarean section alone, with 22 deaths, a mortality of 37·9 per cent. The remaining 14 cases in groups C and D combined had supra-vaginal hysterectomy also performed with intra-peritoneal treatment of the stump, and all the women and 11 of the children survived (Cases 336, 358, 370, 400, 404, 405, 432, 494, 568, 713, 736, 751, 843, 1255). See remarks on infected cases, p. 21, and note to Table V.



It will be seen that the mortality of Cæsarean section for 469 cases of contracted pelvis in favourable cases, *i.e.*, when the patient was "Not in Labour" or "where labour had just commenced" was only 14, a death rate of 2·9 per cent.

TABLE V.

*Table to show Maternal and Fœtal Mortality in both Favourable and Unfavourable Cases of Contracted Pelvis under various methods of operating by Living Obstetricians and Gynæcologists (1867 to 1910).*

| Technique  | Cases | Maternal Deaths | Per-centage |
|--|-------|-----------------|-------------|
| Cæsarean Section alone - - - -   | 969   | 92              | 9·4         |
| Cæsarean Section followed by supra-vaginal hysterectomy; stump with extra-peritoneal treatment - - - -                           | 28    | 4               | 14·2        |
| Cæsarean Section followed by supra-vaginal hysterectomy; dropping stump into abdomen without covering it with peritoneum - - - - | 1     | 1               | 100·0       |
| Cæsarean Section followed by supra-vaginal hysterectomy; stump with intra-peritoneal treatment - - - -                           | 53    | 7               | 13·2        |
| Cæsarean Section followed by panhysterectomy (abdominal) - - - -   | 1     | 0               | 0·0         |
| Extra-peritoneal Cæsarean Section - -  | 6     | 0               | 0           |
| Total - - - - -  | 1058  | 103             | 9·7 %       |

NOTE.—Most of the supra-vaginal hysterectomies with extra-peritoneal treatment of the stump were done (see pp. 16 and 17) before 1898. Most of the supra-vaginal hysterectomies with intra-peritoneal treatment of the stump were done after 1898, and therefore under better circumstances as regards asepsis than previous to that date. The former were, however, done as alternatives to Cæsarean section as a matter of general routine as being then safer, but many of them were septic at the time of operation; the latter were done by some as a matter of routine but by others when the women were thought to be probably infected. It is curious that in 39 cases treated as a matter of routine by supra-vaginal hysterectomy with intra-peritoneal treatment of the stump there were 7 deaths,

whereas those where infectivity was probable (see note to Table IV) had no mortality. It must be remembered that nearly every case upon which Porro's operation was performed for contracted pelvis before 1898 was more or less infected as the result of previous attempts at delivery, and yet, as Table V. shows, the results were very little worse than after the modern intra-peritoneal sub-total hysterectomy taking all the cases together. Whether panhysterectomy which would remove the cervix also would be better than either of the above supra-vaginal hysterectomies has yet to be decided. (See Remarks on Septic Cases, p. 21 and footnote to Table IV., p. 48.)

TABLE VI.

*Table to show Maternal and Fœtal Mortality of Cæsarean Section performed for Miscellaneous Indications (1867—1910).*

| Indications   | Cases | Maternal Deaths | Fœtal Deaths |
|---|-------|-----------------|--------------|
| Ventrification of uterus - - - - -                    | 7     | 1               | 1            |
| Tonic Contraction of Uterus (threatened rupture, &c.) | 8     | 4               | 7            |
| Hour-glass Contraction - - - - -                      | 1     | 1               | 1            |
| Cancer of Rectum - - - - -                            | 8     | 3               | 1            |
| Cancer in Pelvis - - - - -                            | 2     | 1               | 0            |
| Enchondromata, Sarcomata, Osteomata, &c.              | 15    | 3               | 3            |
| Hydatids - - - - -                                    | 1     | 0               | 0            |
| Prolonged Gestation or missed Labour - -              | 4     | 1               | 4            |
| Bicornute Uterus - - - - -                            | 5     | 1               | 1            |
| Relatively large head - - - - -                       | 3     | 0               | 0            |
| Chorea - - - - -                                      | 1     | 1               | 1            |
| Heart Disease - - - - -                               | 1     | 1               | 0            |
| Spinal Meningitis (Convulsions) - - - -               | 1     | 1               | 1            |
| Anasarca - - - - -                                    | 1     | 0               | 1            |
| Myasthenia gravis - - - - -                           | 1     | 0               | 0            |
| Intestinal Disease - - - - -                          | 1     | 1               | 1            |
| Total - - - - -                                       | 60    | 19              | 22           |

## APPENDIX.

The 1282 cases of Cæsarean section collected in the Tables *for all indications* are distributed as follows:—

|              | Cases | Deaths | Percentage Mortality |
|--------------|-------|--------|----------------------|
| England - -  | 841   | 87     | 10·3                 |
| Wales - -    | 13    | 3      | 23·0                 |
| Scotland - - | 375   | 58     | 15·4                 |
| Ireland - -  | 53    | 7      | 13·2                 |
|              | 1282  | 155    | 12·0                 |

Amongst the towns where the largest number of cases have been performed the following may be mentioned:—

|                   | Cases | Deaths. | Percent.<br>Mortality. |
|-------------------|-------|---------|------------------------|
| ENGLAND.          |       |         |                        |
| London .....      | 383   | 36      | 9·4                    |
| Manchester .....  | 155   | 23      | 14·7                   |
| Liverpool .....   | 96    | 11      | 11·4                   |
| Sheffield .....   | 92    | 6       | 6·5                    |
| Leeds .....       | 38    | 3       | 7·9                    |
| Birmingham .....  | 34    | 4       | 11·7                   |
| Wolverhampton ... | 15    | 1       | 6·6                    |
| Newcastle .....   | 15    | 4       | 26·6                   |
| Bristol .....     | 13    | 0       | 0·0                    |
| WALES.            |       |         |                        |
| Cardiff .....     | 13    | 3       | 23·0                   |
| SCOTLAND.         |       |         |                        |
| Glasgow .....     | 304   | 46      | 15·1                   |
| Edinburgh .....   | 59    | 9       | 15·2                   |
| Dundee .....      | 9     | 2       | 22·2                   |
| Aberdeen .....    | 3     | 1       | 33·3                   |
| IRELAND.          |       |         |                        |
| Dublin .....      | 40    | 5       | 12·5                   |
| Belfast .....     | 9     | 2       | 22·2                   |
| Cork .....        | 4     | 0       | 0·0                    |

## APPENDIX A.

Amongst the operators in the various towns the following have done the largest number of cases. (The cases and deaths are given in brackets.) It is evident that those obstetricians whose operations were mainly performed previous to 1900 will necessarily have had a high death rate.

*London.*

R. Andrews (23—2), C. Berkeley (12—1), Blacker (9—0), Bonney (4—0), Champneys (20—5), Dakin (11—1), Duncan (10—2), Eden (17—0), Fairbairn (8—0), Giles (3—0), Godson (3—1), Gow (53—3), Griffith (22—2), Herman\* (11—3), Lewers† (28—3), Lockyer (3—0), McCann (3—1), Phillips 6—0), Playfair (3—1), Routh (10—1), Mrs. Scharlieb (8—1), B. Smith (8—2), Spencer (22—1), Stabb (15—1), Stevens (5—0), Targett (24—0), Tate (5—1), Williamson (13—0).

*Manchester.*

Bishop (5—0), Clifford (9—0), Donald (24—3), Fothergill (9—2), Lea (24—3), Lloyd Roberts (15—4), Sinclair‡ (40—8), Walls (30—3).

*Liverpool.*

Bell (3—1), Briggs (24—2), Gemmell (16—3), Grimsdale (8—2), Stookes (9—1), Wallace (33—1), Willett (3—1).

*Sheffield.*

Barber (46—2), Favell (29—2), Martin (13—2), Phillips (5—0).

*Leeds.*

Croft (12—2), Hellier (24—1).

*Birmingham.*

Malins (6—0), Purslow (10—0), Savage (8—2), Wilson (8—2).

*Wolverhampton.*

Edge (15—1).

*Newcastle.*

Lyle (15—4).

*Bristol.*

Newnham (5—0), Rayner (5—0), Swayne (3—0).

*Cardiff.*

Collins (7—2), Maclean (6—1).

\* Dr. Herman probably had a few others about 1880, but the details cannot be found.

† Dr. Lewers has not included in his list a few cases before 1901 owing to his having no accurate record of them.

‡ Some of Sir W. Sinclair's records at St. Mary's Hospital, Manchester, for 1905-6 cannot be found.

*Glasgow.*

Cameron (71—11), Jardine (113—22), Kerr (85—10), Russell (29—0).

*Edinburgh.*

Barbour (6—0), Brewis (6—0), Croom (12—4), Ferguson (5—1), Haultain (23—2), Lackie (5—0).

*Dundee.*

Buist (4—1), Kynoch (5—1).

*Dublin.*

Gibson (4—0), Horne (5—2), Purefoy (3—1), Smyly (7—1), Tweedy (16—1).

*Belfast.*

Johnstone (7—2).

*Cork.*

Pearson (4—0).

Among the various operators who have sent in cases it may be interesting to notice the runs of consecutive cases (10 and over) without mortality. Andrews (10, 10), Barber (39), Berkeley (10), Briggs (20), Cameron (12, 18), Donald (13), Eden (17), Favell (16), Gow (42), Griffith (10), Hellier (23), Jardine (12, 13, 18), Kerr (10, 16, 11), Lea (15), Purslow (10), Russell (29), Sinclair (17), Spencer (20), Targett (24), Wallace (24), Walls (22), Williamson (13).

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