The Dosage of Scopolamine - Morphine in the Conduct of Labour.

With a record of thirty five cases.

Thesis presented for the degree of M.D. 1925

by -

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I.

This thesis attempts to show the variations in technique, as regards dosage, employed by different workers in the so-called "Twilight Sleep" conduct of labour, and gives a record of thirty-five cases undertaken by the writer during the last nine months of 1924.

One found when occupied in private practice in North London that the dosage of morphine and scopolamine recommended by the vast majority of writers was quite insufficient to produce anything approaching one hundred per cent of successes in the cases that were undertaken. Small doses undoubtedly relieved pain, and in some instances produced partial amnesia, but complete amnesia was never obtained. This appeared to depend on several factors:

1) Most of the cases treated were in a nursing-home which stood on a rather noisy street.

2) The Mother when under the influence of the drugs was liable to be disturbed by noises inside the home, e.g. the crying of infants, as well as by street noises.

3) The type of woman who sought treatment was usually more neurotic than the average London woman; and even the average London woman is more neurotic than the somewhat phlegmatic German woman treated in the cases described by the various workers at Freiburg and elsewhere.

4) In/
In a busy private practice, one was unable to give continuous attention to the cases, and the greater part of the time they were being supervised by the staff of the nursing-home, which was, of course, in telephonic communication. One considered it desirable, therefore, to use as large doses as were compatible with safety to the mother and child, for the purpose of ensuring complete amnesia. After preliminary observations had been made for some time, a record was kept and thirty-five cases were collected. As the results varied considerably, in some respects, from most published reports, it was decided to attempt a short review of the work. The material which follows is arranged under the subjoined headings:

1) Reports of various workers, with special reference to the dosage employed.
2) Digest of these records.
3) Personal record of thirty-five cases.
4) Conclusions.
5) Summary.
6) Bibliography.

1) REPORTS of VARIOUS WORKERS, with special reference to the dosage employed.

The first record of the combination of scopolamine and morphine as used in midwifery was by SteinMüchel at Graz University. In 1903 he reported/
ported twenty cases. Only two injections were given, consisting of morphine gr. $\frac{1}{6}$ and scopolamine gr. $\frac{1}{200}$, and there was an interval of two or more hours between the injections. The results were as follows:

(out of 20 cases.)

Great maternal relief............16
Partial " " ........... 3
No " " ............ 1

Uterine contractions remained normal ....12
" " more frequent....... 2
" " less frequent....... 8
Atony of uterus......................... 3
Forceps deliveries...................... 7
Still births............................ 2
Asphyxia of child (which lived)......... 1

In regard to the three cases of atony of the uterus, chloroform had also been administered, and Steinbüchel hesitated to attribute this complication to the effect of the morphine-scopolamine alone. It is difficult to judge exactly the standard of maternal relief claimed for the method by Steinbüchel, but he remarks that "the mothers were frequently robbed of the memory of events that transpired during the action of the drug." The point one wishes to emphasise here is that moderately large doses were used, but only two were given in each case and an interval of at least two hours elapsed between them.

In 1904, Wartapetian of Jena reported his results in twenty cases. He used moderately large doses/
doses, namely morphine sulphate 0.01 gr. (Gr. \( \frac{1}{100} \)) and scopolamine 0.00033 (gr. \( \frac{1}{200} \)) and some cases received as many as five injections. He reports that the suffering of the mothers was greatly lessened and there were no ill-effects from such comparatively big doses. Also the frequency and intensity of the uterine contractions were little influenced. Fifty per cent of the children were born dazed but did not suffer any further after effects from this.

Raining continued Wartapetians investigations in the same clinic and reported on thirty-six cases, also in 1904. The majority of cases had only two doses (morphine gr. \( \frac{1}{6} \) and scopolamine gr. \( \frac{1}{120} \)). Where frequently repeated doses were given he says that the strength and duration of the uterine contractions were much lessened, but never to the extent of harming the mother and child. No born real complications occurred. One child was asphyxiated but commenced respiration after a short lapse of time.

Weingarten of Giessen reported forty-five cases. He gave only one dose, morphine gr. \( \frac{1}{6} \) and scopolamine gr. \( \frac{1}{120} \).

The results were as follows:

Pain much lessened .............. 38 cases.
Partially........................ 6 "
No/
No result .................. 1 case.
Asphyxia of child at birth; .... 4 cases
Post partum haemorrhage ...... 0 case
Forceps applied ............... 4 cases.
Version performed ............. 1 case.

Puschkin reported 62 cases in 1904. He gave one
dose - morphine gr. $\frac{1}{5}$ and scopolamine gr. $\frac{1}{120}$ -
but in a few cases this was repeated. The results
were as follows:-

Pain very much lessened ........ 10 cases.
" much lessened ............ 42 "
" slightly lessened .......... 1 case.
" not affected .............. 4 cases.

Uterine contractions
unaffected .................... 36 cases.
Uterine contractions
improved ........................ 13 "

(Other seven cases not mentioned).

Infants in condition of asphyxia 6 "
" stillborn .................... 8 "

The stillborn
cases are not ascribed to the effect of the
drugs.

A very important contribution to the literature
of the subject was then given by Gauss of Freiburg
whose technique came to be regarded as the standard
treatment.
treatment. We are here concerned with the dosage.

In the great majority of cases morphine (up to gr. $\frac{1}{4}$) was given only once, but scopolamine in small doses was repeated frequently. The largest dose was scopolamine, $0.0036$ (gr $\frac{1}{3}$) over a period of thirty six hours. More was actually given in one case but that was over a period of fifty-seven hours, the patient in that time receiving scopolamine $0.00375$ (gr $\frac{1}{17}$) and morphine $0.03$ (gr $\frac{1}{2}$).

The usual procedure was to give the first injection - morphine grain $\frac{1}{4}$ and scopolamine $\frac{1}{150}$. and follow this up three quarters of an hour to one hour later with scopolamine gr $\frac{1}{100}$. Subsequently the small injections of $\frac{1}{2}$ grain, $200$ to $450$, were given every half hour to two hours. The ordinary cases had from three to seven injections but there were exceptions such as the long case quoted above. A few drops of a general anaesthetic were given in many cases just at the moment of the birth of the head.

Of the first five hundred cases reported by Gauss, one hundred and nineteen were born oligopnoeic, respiration becoming apparently normal in times varying up to twenty minutes.

Sixty five of the living children were born asphyxiated. In forty seven of these cases, the asphyxia was definitely ascribable to conditions apart from the effects of scopolamine-morphine. In the eighteen remaining cases it was not possible to fix/
fix the case, just as it is often impossible in non-scopolamine cases definitely to explain this condition! Gauss remarks however that he thinks that in some of these, injections had probably been given too close to the moment of birth.

In the five hundred cases there were five stillbirths. One was dead before the treatment started; one died in utero as a result of placenta praevia and version; one died during a prolonged labour in a narrow pelvis, and in this case the foetal heart sounds had not been sufficiently watched; the fourth case was due to version and a prolapse of the cord; the fifth was a breech case which went unobserved during the entire birth, and after the body was delivered the head was held in the vagina as a result of several loops of cord about the neck.

To learn whether the children of this series had suffered more than non-scopolamine cases, Gauss compared these results with 2500 cases which had been delivered in the same institution between 1895 and 1904 and found the comparison very favourable to twilight sleep.

Hocheisen then reported on one hundred cases. He did not follow the technique of Gauss. The patients were not isolated or given complete quiet, and no memory test was applied. The drugs were given until the patient showed no more signs of pain. Small doses were given, morphia being administered only once in the great majority of cases. His largest total dosage was scopolamine 0.002 (gr. $\frac{1}{36}$), and only
in one case more than 0.02 (gr. $\frac{1}{3}$) of morphine. The results were surprisingly good:

- Complete Analgesia.............61%
- Partial " ..................21%
- Absence of " .................15%
- Post partum haemorrhage.......5% (one death)
- Still-birth .....................1%
- Died after birth ...............3%
- Oligopnoea ....................15%
- Asphyxia .......................15%

Lehmann then published, in 1908 and 1909, reports on seventy cases. He gave morphine 0.01 (gr. $\frac{1}{5}$) and scopolamine 0.0005 (gr. $\frac{1}{200}$). Two injections were usually given - with a two hours interval between - and occasionally in longer cases, a third was given. He obtained the following results:

- Complete analgesia.............61.6%
- Partial " ..................37%
- No " ........................1.4%
- Asphyxia in infant.............13.3%
- Oligopnoea in infant...........10%

There were no complications, except negligible ones, but one underdeveloped child died after two days. Lehmann does not ascribe this fatality to the drugs.

In 1907, Preller recorded one hundred and twenty cases - the dosage being similar to that employed by Lehmann. His results, as reported, were:

- Amnesia..........................70%
- Analgesia.......................18%
9.

Negative................12%
Atonic bleeding.........4%
Apnoeic infants........5%
Ciracopnoic............25%

It may be here noted that considerable confusion of thought is evidenced in most of the previous reports mainly by reason of the terms and phrases, "Amnesia", "Analgesia", "pains much lessened", "maternal relief", etc. All that is commonly aimed at in the conduct of a "Twilight Sleep" case is to produce that amnesic semi-narcosis in which the patient undoubtedly experiences pain but remembers nothing about it on becoming fully conscious again. When analgesia is obtained, i.e. when the patient is lying apparently in a deep sleep and shows no sign, by movement or outcry, that she is perceiving pain, that is generally considered to be a sign of overdosage, and unnecessary. The distinction was not fully appreciated until Gauss wrote his treatise on the subject, and even after that was commonly disregarded.

To continue with the series of reports, another article was published in 1907 by Steffen; describing his results in three hundred cases. The dosage he used was scopolamine, 0.00046 (gr.1/40) and morphine 0.01 (gr.1/5), and this was sometimes repeated three to six hours later. In two hundred and fifteen cases out of the three hundred, only one injection was given. The results are quoted as follows:

Favorable/.
Favorable .......... 41.7%
Unfavorable .......... 52%
Uninfluenced .......... 5.6%
Atonic post partum haemorrhage......... 3.3%
Apnoea in infant.... 16%
Asphyxia in infant 2.3%

Also in 1907, Geminder published the results of one hundred cases in which doses similar to those of Steffen were given:—

Favorable results .... 59%
Atonic post partum haemorrhage .......... 5%
Oligopnoic ............. 12%
Asphyxia in infant .... 13%
Died during first week ................. 4%

The following year, Kleinertz gave a report on two hundred and eighty cases, in which the dosage was morphine \( \frac{1}{3} \) plus scopolamine \( \frac{1}{500} \), several further small doses of scopolamine being given. In one case, as much as \( \frac{1}{4} \) gr. scopolamine (total dosage) was given. The results, as far as the mothers were concerned, were:—

Complete amnesia ...... 78%
Partial " ........ 12%
Negative " ....... 18%

Cremer recommended the use of scopolamine - morphine in private obstetrical practice and in 1908 published a report of one hundred and thirty four cases.
cases. He used scopolamine 0.0003 gm. (gr. 1200) and morphine 0.01 gm (gr. 1). This dose was repeated in the majority of cases in fifty minutes and again in two and a half hours. In no single case did he find any harmful effects to mother or child.

In 1906, Bertino made an important contribution to the subject by reporting 400 cases. He used scopolamine (gr. 120) and morphine (gr. 1), never repeating the morphine, and in only a few cases repeating the scopolamine. The results obtained were painlessness in 45% cases; partial success in 19% cases, and in 36% he saw no results. He disapproved of the method because he said that in 70 cases out of the 400, the uterine contractions ceased and remained absent for a time varying from 7 hours to a few days, and the infants were often born apnoeic or asphyxiated.

In 1909, Friésesi of Budapest reported on two hundred cases. He used the technique of Gauss, and the same small doses. The main results quoted were:

- Complete Amnesia ........ 62.5%
- Relief of pain without Amnesia .............. 28%
- Asphyxia in infants.......... 2%
- Oligopnoea in infants....... 15%

Among the earlier writers on the subject of the scopolamine - morphine conduct of labour in this country was Giuseppi who contributed an article to the "Practitioner" in July 1911. He reported on 37 cases. The compound injection which he used in sixteen cases was - morphine hydrochloride: gr. 1/4 or 1/3, hyoscine hydrobromide gr. 100, atropine sulphate gr. 1/100 - 1/100.
In the others, no atropine was used. Of the thirty-seven cases, twenty-one had only a single dose. Sixteen cases had a second dose of hyoscine. The main results were:

- Complete analgesia ........ 16.2%
- Marked " ........... 27%
- Decreased " ........... 37.8%
- No " ........... 19%

Asphyxia of infant ...... 16.2% (6 cases)

Of the six cases of asphyxia, the foetal heart sound in two cases were very faint throughout labour and these two infants could not be revived.

Guiseppe remarks — "As far as can be determined the atropine sulphate had no special effect, and in the later cases was entirely discontinued."

In the same year Solomon and Fresland reported on one hundred cases. They gave small doses by the mouth, namely morphine hydrochloride gr. ½ and hyoscine hydrobromide gr. 1 1/20. The effect on the mother which they claimed for this method was as follows:

- Complete analgesia ........ 10%
- Marked " ........... 8%
- Slight " ........... 20%
- No " ........... 15%

Of these cases, thirty-seven patients had the drugs given by the mouth, and five vomited.

Only "suitable cases" were selected for the treatment.

In 1914 and 1915 Hamar and McPherson in the United/
United States published a report of one hundred cases in which small doses were given (hypodermically) and amnesia in 60% to 70% of cases was claimed.

In 1915 Frankenthal and Baer, also of the U.S.A., reported on thirty-nine cases. They also used small doses and had 33% cases in which there appeared to be no effect produced.

In 1915 Hellman published a very detailed report in his book on sixty-six cases. He used the Freiburg technique of Gauss, already described, with small doses, but the hyoscine frequently repeated, employing the memory test as a guide. In one case, as many as eighteen injections were given - and in this case the child breathed spontaneously.

Of the sixty-six cases, thirty-five women were primiparae. The results claimed were:

- Complete amnesia .......... 67.95%
- Partial " ............ 13.59%
- No " ............. 18.12%
- Postpartum haemorrhage .. 3.03%
- Spontaneous respiration in child...................... 83.44%
- Oligopnoea...................... 11.92%
- Stillbirths.................... 2.98%

One infant (the second of twins) was born asphyxiated and died twenty-four hours later.

Of the twenty-one cases in which amnesia was not complete, there was marked analgesia in eighteen, slight analgesia in two, and only one woman seemed in no way benefited.
Of other writers in this country, Hedley states that he adopted a "standardisation method" in the use of morphine and hyoscine treatment. He gave morphine $\frac{1}{4}$ gr. and hyoscine $\frac{1}{10}$ gr. for the first injection, and repeated hyoscine ($\frac{1}{10}$ gr. $\frac{1}{4}$ gr. $\frac{1}{10}$ gr.) every hour afterwards until the termination of labour. He does not give statistics but says that in the majority of cases the amount of suffering was decidedly decreased, and in many there was "only a hazy, if any, recollection of the process of labour".

Also Haultain and Swift reported forty cases, using the same technique as Hedley in regard to dosage. One case had altogether forty-five injections (i.e. altogether $\frac{1}{4}$ gr. of hyoscine). The results were as follows:

Amnesia and analgesia ............ 75%
Slight Amnesia ..................... 13%
No Amnesia ......................... 12%
Slight post-partum haemorrhage.. $2\frac{1}{2}$% (one case).
Forceps used ....................... 35%

Five infants were still-born but these included:
1) a case of contracted pelvis and a prolapsed cord.
2) a badly nourished premature foetus with a serious maternal heart lesion.
3) Craniotomy in a case of contracted pelvis.
4) a seven month's foetus.
5) an apparently normal labour where the mother had eleven injections in all.

Four of the living children required artificial stimulation.
Innes and McCall reported cases in the February number of the "Practitioner", 1912. McCall gave only a single dose and states that she gave mostly only single doses and does not "feel inclined inclined to increase the amount". No reason is given for thus limiting the dosage.

Innes also gave only one dose for he found that when the "anaesthesia" due to it passed off, a second dose had no effect. His method therefore only aimed at relieving pain for a few hours (may two to four hours).

In 1918, Johnstone quoted his results in seventy cases (although by the courtesy of Sir Halliday Croom he had then seen over two hundred cases). He usually gave morphine $\frac{1}{3}$, and hyoscine $\frac{1}{100}$. After this, hyoscine (gr 400) was given according to circumstances and not at any stated intervals.

Greenwood in his book on "scopolamin-morphine semi-narcosis during labour" published in 1918, found that in his experience, the initial dose usually had to be morphine $\frac{1}{4}$ and scopolamine $\frac{1}{100}$. Hyoscine (about gr 100 was thereafter given about every 1\frac{1}{2} to 2\frac{1}{2} hours. He reports on 200 cases, of whom 138 were primiparae and 62 were multiparae. There were:-

5 breech presentations.
2 transverse "
2 brow "
3 persistent occipito-posterior presentations.

All the rest were ordinary vertex presentations.

There were no maternal deaths.

Four infants were still born (i.e. 2\% in X as against the usual average of 2\% to 2\% in general midwifery practice).
This percentage is very good, considering that the four cases in question were as follows:—
1 and 2) Premature detachment of the placenta.
3) Breech presentation which was originally transverse and was turned. "the head and both arms were extended and delay in delivery ensued."
4) "A difficult forceps extraction, with cerebral or medullary haemorrhage.

There were 27 cases of oligopnoea in the infant, out of 200 cases. In 7 of these 27, a second dose of morphia, gr. 12 or entocide had been given, and Greenwood feels certain that the oligopnoea in these 7 (without a single exception) indicates that the morphia is the main factor.
Previous to this, in 1913, Siegel of Freiburg reported on 200 cases. He adopted a standardisation method - using the same dosage for each patient. The preparation used was narcoephine, a meconic acid compound of morphine and narcotine - in addition to scopo-

The time-table was as follows:-

<table>
<thead>
<tr>
<th>First Injection</th>
<th>Scopol. gr</th>
<th>Narcoephine</th>
<th>gr</th>
</tr>
</thead>
<tbody>
<tr>
<td>3/4 hr. later.</td>
<td>1/100</td>
<td>1/150</td>
<td></td>
</tr>
<tr>
<td>1 1/2 hrs.</td>
<td>1/400</td>
<td>1/400</td>
<td>1/4</td>
</tr>
<tr>
<td>1 1/2 hrs.</td>
<td>1/400</td>
<td>1/400</td>
<td>1/4</td>
</tr>
<tr>
<td>4 1/2 hrs.</td>
<td>1/400</td>
<td>1/400</td>
<td>1/4</td>
</tr>
<tr>
<td>6 hrs.</td>
<td>1/400</td>
<td>1/400</td>
<td>1/4</td>
</tr>
<tr>
<td>7 1/2 hrs.</td>
<td>1/400</td>
<td>1/400</td>
<td>1/4</td>
</tr>
<tr>
<td>9 hrs.</td>
<td>1/400</td>
<td>1/400</td>
<td>1/4</td>
</tr>
<tr>
<td>10 1/2 hrs.</td>
<td>1/400</td>
<td>1/400</td>
<td>1/4</td>
</tr>
</tbody>
</table>
and so on.

One has not been able to obtain his results of this technique.

In 1920 Williams, of the John Hopkins Hospital, says in his book, "Obstetrics" that his dosage is morphine gr 1/6 and hyoscine, gr 1/150. A further dose of hyoscine, gr 1/300, is given one half to one hour later and he says that the desired degree of amnesia was thus obtained in 75% of his cases. An interesting point is that he found in the great majority of cases that the pulse was accelerated.

In the transactions of the Edinburgh Obstetrical Society, 1920 - 1921, Vol. xii. page 42, Haultain gives "A Further Experience of the Conduct of Labour under/
under Twilight Sleep". He cites 150 private cases in which he obtained the following results:

Complete Amnesia...........50%
Partial " .............50%
No effect ...............20%

The treatment as regards dosage consisted of giving first morphine gr $\frac{1}{4}$ and hyoscine gr $\frac{1}{150}$. After three-quarters of an hour, hyoscine gr. $\frac{1}{450}$ was given, and repeated every hour till the labour was completed.

In patients who were noisy or restless in the second stage, chloroform was given during pains.

The effect on the infants was:

Oligopnoea ...............4 cases.
Asphyxia .................4 "
Stillborn (after craniotomy) 1 case.

Haultain departed from the above treatment only occasionally when there was much restlessness before full dilatation of the cervix — in which cases a further $\frac{1}{3}$ gr of morphin was given. One of these patients had four additional doses of morphin, gr $\frac{1}{3}$, at intervals of from eight to ten hours. He also states, "Morphia has been credited with being the cause of the oligopnoea. This I am not prepared to admit, as very much larger doses are given in eclampsia without such evil effects. It would appear, therefore, as if it was an idiosyncrasy on the part of the child in a very small percentage of cases."

In the discussion on Haultain's paper, Ballantyne reported on 320 cases supervised by him in Hospital/
pital in 1917 and 1918. He had found that where the
child was born about three and a half hours after the
primary injection of morphine and scopolamine, it was
very difficult to resuscitate. Where the labour oc-
curred either under two hours or was considerably lat-
er than three and a half hours after the primary in-
jection, there was no difficulty at all.

Leckie gave the statistics of 91 cases (all prim-
iparae) treated by him in hospital in 1920. The ini-
tial dose was morphine $\frac{1}{6}$ gr. and hyoscine $\frac{1}{100}$ gr.
Hyoscine gr. 450 was repeated every hour till the head
was on the perineum. Morphine $\frac{1}{6}$ gr. was repeated in
only a few cases. The results were "good" in 83.5%
of cases. In private practice he got very good re-
sults in 65% of cases, and fair results in 20%. As
regards the children, 10% showed slight cyanosis.
3.3% required prolonged artificial respiration. "In
two of these cases there was no apparent cause; in the
third the child was born within two hours of the last
injection of morphia. There had been two deaths, but
in one case version was performed, and in the
other craniotomy".

In 1922, Dr Hirschmann gave a paper before the
British Medical Association (Section of Obstetrics
and Gynaecology) (B.M.J. 1922. P. 669) recording 140
cases carried out under the supervision of Dr. J.W.
Ballantyne. He had tried the addition of atropin
sulphate gr. $\frac{1}{150}$ to the usual initial dose of morphine
gr. $\frac{1}{4}$ and hyoscine gr. $\frac{1}{100}$, and came to the conclusion
that/
that by so doing there was much less risk of oligopnoea in the child. This he thought was the case even when the child was born in the "danger period" referred to by Dr. Ballantyne (namely three and a half hours after the primary injection).

More recent literature includes a chapter on "Anaesthesia in Obstetrics" by Fleming, of Bristol, in a volume by various authors "Modern Methods in Abnormal and Difficult Labour". (1924) He follows the technique described by Greenwood, Schwarz and Krebs and gives morphine, gr. 1/5 and scopolamine gr. 1/50 as a first injection. After about 1½ hours, the scopolamine is again administered the dose varying between 1/50 and 1/500 of a grain, according to the degree of drowsiness shown by the patient. One or two additional doses of scopolamine may be given later.

Fleming does not state his results obtained from this technique.

2) Digest of the preceding records.

Of the thirty-three authorities quoted, Two used comparatively large doses (morphine gr. 1/5 and scopolamine gr. 1/200, repeated as many as five times). Three used medium doses, (e.g. morphine gr. 1/5 and scopolamine gr. 1/200 repeated as often as three times) and Twenty-eight used small doses, (on the average, one dose of morphine gr. 1/6 plus scopolamine gr. 1/50 with a number of very small doses of scopolamine alone e.g. gr. 1/50 at intervals later) Altogether
3270 cases are quoted.

In 1905 cases in which the effect on the mother, as regards the relief of pain, is mentioned, the following figures are given:

- Amnesia, analgesia, or great maternal relief: - 1082, i.e. 56.0%
- Partial or slight maternal relief: - 544 i.e. 28.0%
- No relief: - 279 i.e. 14.7%

The various writers pick out various points of interest in their cases and no complete figures regarding any one point can be quoted in the entire 3270 cases. We find, however, in the foregoing material that:

1) In 748 cases, there were 18 stillbirths or 2.4%
2) In 1590 cases there were 139 children born in a condition of asphyxia i.e. 8.74%.
3) In 1456 cases, 272 children were born oligopnoeic i.e. 18.6%
4) Of 373 cases, 11 died within a few days of birth i.e. 2.9% but the proportion should, no doubt, be very much smaller than this, as Gauss, Steffen and others, in reports on large numbers of cases, do not mention any deaths.
5) Of 731 cases, post partum haemorrhage is reported in 27 cases, i.e. 3.69%. Here again, for the reason stated under (4), the proportion is probably much smaller. Most writers say that scopolamine-morphine has never in their experience appeared to cause post-partum haemorrhage.

We see therefore that the technique advised by
these authors does not by any means result in unqualifiled success. To one hundred mothers who ask for twilight sleep, one could promise, by following the recommended methods, to give great material relief only in 56 or 57 cases, partial or slight relief in 28 or 29 cases, and no relief at all in 14 or 15 cases.

## personal record of cases.

The following 35 cases were undertaken in London between May 1924 and January 1925, all of them, with the exception of two, in a nursing home.

### DRUGS.

The preparations used were those produced by Messrs Burroughs Wellcome & Co., namely:–

1) 'Tabloid' Hypodermic Hyoscine Compound A.

containing:

<table>
<thead>
<tr>
<th>Ingredient</th>
<th>Quantity</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hyoscinae Hydrobromidi</td>
<td>$\frac{1}{100}$ (.000065 gm.)</td>
</tr>
<tr>
<td>Morphinae Sulphatis</td>
<td>$\frac{1}{6}$ (.011 gm.)</td>
</tr>
<tr>
<td>Atropinae Sulphatis</td>
<td>$\frac{1}{180}$ (.00036 gr.)</td>
</tr>
</tbody>
</table>

2) 'Tabloid' Hypodermic Hyoscine Compound B.

containing:

<table>
<thead>
<tr>
<th>Ingredient</th>
<th>Quantity</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hyoscinae Hydrobromidi</td>
<td>$\frac{1}{100}$ (.000065 gm.)</td>
</tr>
<tr>
<td>Morphinae Sulphatis</td>
<td>$\frac{1}{4}$ (.018 gm.)</td>
</tr>
<tr>
<td>Atropinae Sulphatis</td>
<td>$\frac{1}{180}$ (.00045 gm.)</td>
</tr>
</tbody>
</table>

3) 'Tabloid' Hypodermic Hyoscine Hydrobromide gr $\frac{1}{200}$ (.00052 gm.)

The first two preparations will hereinafter be called 'A' and 'B' respectively.

The manufacturers claim that of the three stereoisomeric forms of scopolamine (or hyoscine) which exist, only
only the pure laevo variety is present in their compounds. Recent work in the Simpson Memorial Hospital Edinburgh, described in articles by Dr. Chassar Moir in the Edinburgh Medical Journal, Vol. XXXII, 1925 confirms the view that the laevo variety is the only active one in producing amnesia.

Atropine is contained in the compounds 'A' and 'B' with a view to counteracting the depressant effect of the morphine on the respiratory centre.

The results obtained from these preparations would indicate that they are very accurate as regards dosage and uniform in composition. (It seems likely that many of the poor, and sometimes disastrous, results obtained in the early experiments in twilight sleep were due to the undoubted impurity of the scopolamine preparations of those days.)

**TECHNIQUE**

The technique adopted was as follows:—

When the woman's pains were beginning to cause her marked discomfort or anxiety, an enema was given, followed by a warm bath. The first injection was then administered hypodermically, namely Compound 'B' (Morphia gr. 1/4, hyoscine gr. 1/100, atropin gr. 1/100). It is obviously convenient to give an enema at this time and the warm bath no doubt helps to induce sleep.

Quiet, and an atmosphere of restfulness were then obtained as far as possible, by putting cotton wool in the patient's ears, darkening the room, etc.

A second injection was given at anything from one to
to four hours later (Usually two hours) Compound 'A' being employed this time. (Morphine gr. $\frac{1}{6}$, hyoscine gr. $\frac{1}{100}$, atropine gr. $\frac{1}{130}$). The length of time between the first two injections varied greatly with individual cases and depended on the response to the first dose. A few patients fell asleep in half an hour or less. Others became drowsy, slightly confused, and evidently not fully aware of what was going on. A few showed no change whatsoever and became even more nervous, fearing that treatment was not going to prove satisfactory. In these the second injection was given in about one hour. The memory test was applied in a few doubtful cases but usually one judged the necessity for another injection by other signs, e.g. the general appearance, an 'aware look' in the patient's eyes and her answers to questions - whether sensible or not. The second injection was not hurried, of course, where the patient showed the slightest sign of any intolerance to the drugs such as 'great restlessness'.

A third injection was given in from two to four hours after the second. This time, hyoscine gr. $\frac{1}{200}$ was usually given. If however the patient showed signs of becoming too wide awake, and provided the foetal heart sounds were good, one did not hesitate to give Compound 'A' again (i.e. morphine gr. $\frac{1}{6}$, hyoscine gr. $\frac{1}{100}$, atropine gr. $\frac{1}{130}$.)

If required, a fourth injection, a fifth, and even more were given at intervals of about three hours. Usually/
Usually these consisted of hyoscine $\frac{1}{200}$ and occasionally less, but sometimes in very prolonged cases, more injections containing morphia were given. Thus it will be seen in one case where twilight-sleep went on for 26 hours and 20 minutes, the mother had altogether morphine $\frac{1}{12}$, hyoscine $\frac{2}{25}$, and atropine $\frac{1}{450}$. Of this total, morphine $\frac{1}{2}$ had been administered twice (in doses of $\frac{1}{6}$) at intervals within 7 hours and 40 minutes of the birth of the child and yet it was born crying and with no signs of any respiratory or cardiac irregularity. This prolonged labour, was, of course, a very exceptional one. The usual case, as will be seen, had only about four injections.

Usually, also, a mask on which a little chloroform had been dropped was placed over the patient's face just before the actual expulsion of the child.

Under this regime, as will be seen from the cases quoted, complete amnesia was obtained in 100% of the mothers, except in two cases where each had one small "memory-island". Twenty three remembered nothing of the labour after the first injection; nine remembered nothing after the second injection; one, nothing after the third injection.

The great majority of the patients were of the sympathetico-tonic type with naturally warm skin, quick pulse, large pupils, and the 'nervous temperament'. These are well known to have a relative insusceptibility to atropine, and probably also to hyoscine.
hyoscine - as compared with the phlegmatic vagotonic type with cold skin, bradycardia, and small pupils. It has already been explained that small doses gave very poor results for various reasons, e.g. the nervous type of patient, the noises outside, and also occasionally inside, the nursing-home. Also with small doses 'memory-islands' were liable to remain, and one or two strong pains occurring during these left an impression of continuous pain for hours. Where large doses of morphine were given, however, the pains were so much deadened that if any pain occurred during a hiatus in the amnesia, it did not rouse the patient from her dreamy condition.

**EFFECT ON THE MOTHER.**

During the administration of the drugs, the average patient was always capable of being partially roused when spoken to. Usually the eyes were closed, the face, neck and sometimes the upper extremities flushed, the pupils dilated, the skin moist, and the breath had an unpleasant odour. About 20% of the cases were restless, moving about and occasionally turning over in bed. Except in the drowsiest cases, every 'pain' produced some evidence of suffering such as a groan, a clenching of the hands, a movement of the body, or an expression of pain on the face. Evidence of complete lack of pain was regarded as a sign of overdosing and no further injections were given until it was quite clear that sensibility to pain was well re-established.
The patient was nearly always thirsty and asked frequently for water. Usually catheterisation was required at one time or another as well as just before the actual delivery of the child.

In a few cases, rhythmical contractions of the palmar muscles and occasionally of the forearms were observed. Also in one case the position of tetany was assumed by both hands.

The knee-jerks and ankle-jerks—indeed, all the deep reflexes—were invariably markedly exaggerated, occasionally clonus being present. As regards the superficial reflexes, no attempt was made to elicit the abdominal reflex, but in the plantar reflex, an extensor response was obtained in a number of cases, particularly in those patients who were very somnolent. The reflexes were not tested where the patient was rather wakeful, as one did not wish to risk rousing her unduly.

The temperature was but little altered in any case except for a small rise, and was in no case ever above 99.4°F.

The breathing was found to slow down slightly, usually to about fifteen or sixteen respirations per minute. In one case it became much slower than this, namely twelve respirations per minute, but in no case was the breathing ever shallow, and invariably it quickened during a pain or when any manipulation such as catheterisation or vaginal examination was made.

The pulse rate, taken between pains, was increased in about 75% of cases. In the average it was about 92/
92 per minute though in one instance it rose to 130 per minute for a short time. Most observers with the exception of Williams of the John Hopkins Hospital record a diminution in the pulse-rate.

Thus Greenwood reports:

Increased pulse rate in ........0½% cases.
Unchanged " " " ........34% "
Decreased " " " ........57½% "

Atropine was not used in their preparations, however, and this may be the explanation of the increased pulse rate observed by the writer.

As regards the all-important effect on the uterine contractions little can be said with certainty. They appeared in a few cases to diminish slightly in frequency for perhaps half an hour after the first injection. The former rhythm was then taken up and gradually quickened, as in the ordinary physiological labour. The contractions remained strong, even with large doses of morphia, though they were probably rather less frequent than they would have been without drugs. The result of this was that the second stage of labour was no doubt somewhat lengthened. On the other hand the first stage was definitely shortened by reason of the hyoscine. It was found to be particularly valuable in the case of primiparous patients, especially elderly ones - in hastening the dilatation of the cervix. As will be seen from the cases quoted later, the total duration of the labour was perhaps two hours shorter than the average in the case/
case of multiparae. This curtailment of the time of
course, is partly accounted for by the fact that in
a number of cases the child was delivered by forceps
probably an hour before it would have been born had
the labour been allowed to continue naturally.

The average patient slept for about six hours
after the confinement and was drowsy for another six
hours. A few became fully conscious in an hour after
the termination of labour. In all, except one in
which there was post partum haemorrhage, there was a
complete absence of the shock and exhaustion so fre-
quently seen in confinement cases. Most of the moth-
ers volunteered the information that they felt ready
to get up out of bed the day after the confinement.
In no case was there observed any undue after-effects
such as retardation of the flow of milk, abnormalities
of the lochia, or delayed involution of the uterus.

**EFFECT ON THE CHILD.**

During labour the foetal heart was frequently
listened to, but no marked alteration in the fre-
quency or intensity of the sounds was heard except in
one premature case described later.

Of the thirty-five cases, eighteen babies were
born crying and showed no difference in appearance,
respiration or heart action from that of babies born
in ordinary physiological labour, except that they
remained drowsy for several hours. Three or four
cases showed a slight degree of oligopnoea for a
minute or two.

In the other cases, the effect of the drugs was
much more marked. On expulsion, the infant usually
took one fairly deep breath and perhaps uttered a cry. There was some movement of the face and limbs. It then lay quite still for about a minute with slightly dilated pupils, not cyanosed or looking particularly white, but without breathing. During this interval there might be slight movement of the limbs or eyelids. The heart action was regular but might slow down about ten to twenty beats. Another quick inspiration was then taken. The heart quickened slightly and there might be a few more movements. The child again lay quite still for about another minute or even more. Another inspiration was taken, and gradually the interval between each breath grew shorter until in about seven to fifteen minutes, respiration was quite satisfactory. The child appeared drowsy however for a varying length of time afterwards. Occasionally while the respirations were infrequent there would be a slight degree of cyanosis between each breath for the first three or four minutes.

One did not resort to artificial respiration except in three cases. The usual procedure was to wrap the child immediately in a warm blanket and place it on a hot water bag (of about 100°F. in temperature.) In a few cases, the child was put in a hot-water bath for a minute and in cases where the heart began to slow down unduly, an injection of camphor or 1/2 in oil, was given, though it is questionable if this were really necessary. In no case did any mucus or other secretions have to be sucked out of the child's upper air passages. It will be seen, therefore, that the/
Record of 35 cases,
in tabular form.
the usual treatment consisted merely in allowing the child to "sleep off" the effect of the drugs.

Usually the child was sleepier than the normal for about twenty-four hours, and after that in a few cases, required to begin with, some coaxing to get it to suck. On the other hand there was no delay in the action of bladder and bowels, and the normal metabolic and nutritional processes appeared to be unaffected in any way. All the cases recorded were seen daily for at least ten days after labour, and a few at irregular intervals for the next few months. In no case was there any ailment worthy of record to be reported.

Charts of cases should be inserted here.

An analysis of the above thirty-five cases shows the following: - Eighteen of the mothers were primiparous. There were twelve cases of second pregnancy and five of third pregnancy.

The average age of the mother was: - 30.2 years, the youngest being 23 and the oldest being 44.

The average duration of the labour was 19 hrs. 6 minutes in the case of primiparous, and 18 hrs. 32 mins in the multiparous.

The average duration of treatment - from the first injection to the expulsion of the child - was 9 hours 2 minutes.
The average total amount of drugs given was.

- Morphine 25 gr. (i.e. well over half a gram).
- Hyoscine 1/2 30cc. gr.
- Atropine 1/6000 gr. (approximately 1/33 gr.)

Forceps were applied in 22 cases.

There were no maternal deaths.

Two foetuses were stillborn.

The average pulse was above 80 in all but 3 cases, and above 90 in all but 14 cases, out of the 35.

In 25 cases, no effect on the frequency of the uterine contractions was observed. In 4 cases there appeared to be an increase in the frequency and strength of the contractions. In 4 cases there was a distinct slight slowing down of the contractions and in one case a marked slowing. Also in one case, Mrs. T., a primipara with very hard tissues and rigid cervix, labour appeared to have started definitely on the 21st Sept. 1924, and on an injection (Compound 3) being given, she fell asleep, and the pains stopped for 22 hours.

The presentations were as follows:

- Left occipito-anterior ........... 20
- Right occipito-posterior ........ 7
- Right occipito-anterior .......... 2
- Breech ............................. 1.

Eighteen infants were born crying.

Fifteen infants were born in a condition of oligopnoea or even asphyxia which lasted for a few minutes.

Two were still born; artificial respiration being resorted to in these cases, and in one other.
Twenty-three mothers remembered nothing of the labour after the first injection.

Nine remembered nothing after the second injection.

One remembered nothing after the third injection.

One faintly remembered being asked to smell the chloroform mask and one remembered the placenta being expressed.

In short, complete amnesia was obtained in every case except two who had only one memory-island each.

Points arising from the Case-Records:

In the two cases of stillborn child, the blame cannot altogether be laid justifiably at the door of the morphine and hyoscine injections.

In the first case, Mrs. B., the foetus was small and poorly-nourished. The mother had been pregnant only eight months and there was a marginal placenta previa. Slight bleeding had been going on for about 21 hours before she asked for medical aid. The foetus was then lying transversely and the heart sounds were fairly good. The presentation was converted into a breech and labour terminated 3½ hours after the first injection. Throughout labour very slight bleeding continued and the foetal heart became fainter. At birth there was no pulsation in the cord and the placenta came away within a few seconds of the foetus.

In the other case Mrs. M. the mother had had albuminuria, headache, and some nausea for three weeks before the confinement but it was not thought advisable/
advisable to induce labour. No foetal movements could be felt the day before labour and the heart-sounds were not heard.

It will be noticed that two other cases were complicated by albuminuria. One, Mrs. W., had slight albuminuria and chronic bronchitis for the last two months of pregnancy. The other, Mrs. S., had had albuminuria at the first pregnancy and a stillborn child was produced. (No "Twilight-Sleep" was administered on that occasion.) At this, her second pregnancy, there was also marked albuminuria. The foetus was a wizened female child but subsequently did quite well.

There was one case of post-partum haemorrhage which was somewhat severe. (Mrs. C.) 1cc of pituitrin was given but appeared to have little effect. Ergotin was therefore administered, and together with the ordinary measures of massage of the uterus and raising the foot of the bed etc. A rectal saline was subsequently administered. The mother was a somewhat stout girl of 26 with a very flabby musculature and during last three months of pregnancy had had several attacks of dyspepsia, apparently due to an atonic, dilated stomach. She had also taken practically no exercise of any kind for these three months. The puerperium was uneventful except for one bout of vomiting and epigastric pain on the 9th and 10th days.

In this connection, Greenwood says that in the experience of Croom, Guiseppi, Fairbairn, and himself, that/
that the risk of post partum haemorrhage is not increased. Indeed, Fairbairn regards antepartum haemorrhage as an indication for twilight sleep.

One case, Mrs. A., had a rheumatic history and a presystolic murmur. The heart did not dilate appreciably during or after labour.

One case, Mrs. A., was interesting because of the fact that the pregnancy dated from a single coitus, the duration of gestation being 257 days. There was premature rupture of the membranes but the labour, though dry, was not unduly prolonged.

Labour was induced 3 weeks before term in the case of Mrs. W., because of a much contracted pelvis. Pelvimetry showed the intercristal diameter to be $10\frac{1}{2}"$, the inter-spinous to be $7\frac{1}{4}"$ and though the patient was a very fat Jewess, the external conjugate was only $7\frac{1}{2}"$.

There were 4 babies born before term, namely

1. that of Mrs. McC. (3 weeks premature).
2. that of Mrs. A. (257 days foetus, reckoned from single coitus).
3. that of Mrs. B. (one month premature) stillborn.
4. that of Mrs. W. just described (induced 3 weeks before term).

Morphine was given on one occasion only 30 minutes before the expulsion of the child, on another occasion 45 minutes before birth, and on another, 55 minutes before. All three children were born crying. On the average, however, in the 35 cases, the last injection containing morphine was given 2 hours 37 minutes before the actual delivery.
In one case Mrs McG., hyoscine hydrobromide $\frac{1}{2}$ gr. was given only 15 minutes before the birth. The injection, Comp. 'A' (containing morphine $\frac{1}{6}$ gr. and hyoscine $\frac{1}{100}$ gr.) etc. had been given 1 hour 30 minutes previous to that, and in this case the baby was somewhat cyanosed for 5 minutes.

It should be noted that the delay between the onset of labour and the first injection in these cases is explained by the fact that the mother did not always send for medical attention or report to the nursing-home immediately; and also because sometimes the pains were so bearable as not to call for the immediate administration of narcotics.

One would like to have made a great many more observations on the cases, but the imperfection of the records is partly due to the difficulty one found in private practice of spending as much time on investigations as is desirable.

4) CONCLUSIONS.

It is realised that no conclusions of any great value can be drawn from so small a number of cases as thirty-five. On the other hand the technique described was based on work done in about three hundred cases between 1919 and 1924 by one's colleague Dr. M.P. Paton, M.A., B.Sc., etc., for whom the writer wishes here to express his sincerest admiration as an original worker and his deepest gratitude for much tuition and supervision. No detailed record of these three hundred cases/
cases was kept, but the results obtained were very similar to those quoted above. What references can be made from the thirty-five cases rather indicate that much more latitude may be allowed in regard to technique than has previously been conceded.

The greatest difference lies in the dosage and times of administering the injections. We have already said that the average total amount of morphine given was \( \frac{17}{30} \) gr. or well over half a grain. From the literature quoted one has seen that the average amount of morphine given was gr. \( \frac{1}{4} \). Similarly, in the thirty-five cases detailed above, about \( \frac{1}{8} \) gr. of hyoscine was given, as against an average total of \( \frac{1}{40} \) or less by the various writers on the subject. Also, in addition, an average total of approximately \( \frac{1}{5} \) gr. of atropine sulphate was given. A few writers gave atropine for a time and discontinued it, as they did not find it to have much appreciable effect. The only exception as we have seen, was Hirschmann, who came to the conclusion that it minimised the risk of oligopnoea in the child. While one can scarcely make a definite categorical statement on the point, one feels that this view is a tenable one. Also the atropine no doubt lessens the depressing effect of the morphine in the mother. The fact that much larger doses of morphine and hyoscine were given than is regarded as safe by the majority of workers rather suggests that the addition of atropine is at least one factor explaining the difference of opinion as to dosage.

Another possible explanation is that in the earlier experimental/
experimental days of the treatment, workers could not be so sure of the actual strength of the drugs they were using - especially in the case of hyoscine, with its frequent admixture of stereoisomeric forms, and so used small doses for safety's sake. From the literature, it seems almost certain that any disasters which have occurred were either due to unintentional over-dosage because of the impurity of the preparations used, or to an idiosyncracy in the mother; and similarly the complete failure to obtain results, as reported by many workers, must be due to imperfect technique, too small doses, or, in a few cases, high tolerance to morphine-scopolamine in the mothers.

Another difference in the technique employed in these recorded cases was that morphine and hyoscine were frequently given irrespective of the stage to which the labour had advanced. Almost all writers have condemned this. Thus Corbett's view was that the giving of morphine was safe provided that the child was not born until at least four hours after the last injection. Gauss, in attempting to explain the temporarily asphyxiated condition in which some infants were born, says that in some of these, injections had probably been given too close to the moment of birth. Lackie mentions that in one of his cases which required prolonged artificial respiration, the child had been born within two hours of the last injection of morphia. On the other hand, Greenwood admits the possibilities of doses given near the termination of labour - though strongly opposed to it as a general rule.
Thus he says, "In one recent case, at 11 a.m. I gave \( \frac{1}{6} \) gr. of morphine and \( \frac{1}{100} \) gr. of scopolamine. At 12.10 p.m. an absolutely normal infant was born with no trace of oligopnoea." We have seen, too, that Ballantyne did not find any harm coming to the mother or child if the birth took place within two hours of the last morphine injection, but considered the danger period to be about three and a half hours after the injection. In the above thirty-five cases, we have already reported that the last injection containing morphia was given on the average, 2 hours and 37 minutes before the birth of the child. In the recorded cases, eighteen infants were born crying or with no signs of oligopnoea, and the mother in these cases had had an injection of morphine on an average only 1 hour 55 minutes before the birth. Thus it would seem that the contention about the danger of giving morphine too near the actual birth has been underrated. In the fifteen cases in which the infants had various degrees of oligopnoea or asphyxia, the last injection of morphia had been given, on an average, 2 hours, 40 minutes before birth. As a negative argument against the supposed danger of giving morphine too near the time of birth, it will be seen that in the five cases in which morphine was given over four hours before (Average 4 hours 42 minutes.) four infants were oligopnoeic! In the first case of stillbirth (with antepartum haemorrhage, marginal placenta praevia, breech presentation, and prematurity) only one injection of morphine/
morphine was given, and that 4 hours 45 minutes before the birth. In the other stillbirth—in which the foetus was probably dead the day before labour commenced, the last injection of morphine had been given 9 hours 45 minutes before birth, the only other intervening injection being hyoscine, gr. 200 5 hours 45 minutes before birth.

Undoubtedly a high percentage of infants were born in a condition of oligopnoea or asphyxia, namely 15 cases, or 42.85%, as against about 28.75% recorded in the literature. But does this matter much? A certain amount of moral courage is required to leave these children alone and regard the condition as a transitory one. As has been already stated, artificial respiration or stimulants were almost never found necessary. The infants were wrapped up in a warm blanket, placed on a hot water bag, and allowed to "sleep off" the effect of the drugs. It has also been noted that in no case was it necessary to suck mucus or other secretions of the child's upper air passages. In this connection, Aschoff of Freiburg, referring to the first thousand cases reported by Gauss, remarks that there were 3% less foetal deaths than in non-Twilight cases, and offers as an explanation the fact that the breathing is slightly delayed and in preventing inspiration before the head is fully born thus obviates the aspiration of fluids.

Forceps were applied in 22 cases. In a great number of these, however, the mother would undoubtedly have/
have delivered herself naturally within another hour or two, and the instruments were used only because of the exigencies of general practice.

The most satisfactory feature of the treatment was the complete amnesia obtained in the mothers. As has been reported, complete amnesia was obtained in all cases except two, each of whom had only one small "memory" island. (i.e Complete amnesia 94.3%

Almost" "  5.7%

This compares very favourably with the average results reported above in the literature on the subject, namely: -

Amnesia, analgesia or ..... 
Great maternal relief.............56.8%
Partial or slight relief.........28.5%
No relief........................14.7%

One knows that a mother who asks for "Twilight Sleep" and expects the labour to take place in complete oblivion is gravely disappointed if she belongs to the 43.5% who enjoy only "partial relief" or who have no relief at all. Usually, of course she adopts a philosophical outlook on learning that a greater relief of pain for her would mean a correspondingly greater risk to her baby's chance of life. No doubt smaller doses are wiser in the end for this reason. Nevertheless, though one is not advocating the technique detailed above as the best or safest method, one feels that experiment along the lines suggested would be worth while.

The "standardised dosage" method, as advocated by Siegel,
Siegel, Haultain, Lackie, and others, would probably not be safe when bigger doses were used. In any case, the standardised dosage system is only one of convenience. It can never supplant a method which takes into account the body-weight of the individual, her type (varying from vago-tonic to sympathetico-tonic) her reaction to the drugs, the duration of labour, and other details. A woman who has been treat successfully by "Twilight Sleep" in her first confinement will, for instance, usually be found to require smaller doses the second time as she has confidence in the method and becomes drowsy and amnesic much more readily.

Various writers have suggested as contra-indications to Twilight Sleep such conditions as heart disease, pulmonary disease, albuminuria, prematurity of the foetus, right occipito-posterior presentations etc. As already reported there was one case of mitral stenosis, one of chronic bronchitis associated with albuminuria, two other cases of albuminuria, four infants born before term, and seven right occipito-posterior presentations. The two still born infants occur in this group. One (in which the mother had albuminuria) was probably dead the day before labour began. The other was a month premature (the case of ante-partum haemorrhage, marginal placenta praevia and breech presentation). All the other infants of this group did well and four of the seven R.O.P. presentations rotated themselves. From a consideration of these cases, therefore, one would perhaps be inclined to give smaller doses, without actually acknowleding the/
the absolute validity of the contra-indications. One argument against any supposed contra-indication is that there is possibly more danger in the strain of an ordinary non-Twilight labour than when morphine-scopolamine is administered and is successful in obviating shock.

5) **SUMMARY**

The dosages employed and the results obtained in "Twilight Sleep" by thirty-three authorities are quoted. It is shown that the great majority (twenty-eight) used small doses, namely (on the average), one dose of morphine \( \frac{1}{6} \) plus scopolamine \( \frac{1}{150} \), with a number of very small doses of scopolamine alone, e.g. \( \frac{1}{400} \) at intervals later. With this dosage, the results obtained were, as regards the mother:-

- Amnesia, analgesia, or great maternal relief...56.8%
- Partial or slight maternal relief ..........28.3%
- No relief......................................14.7%

and as regards the child:-

- Born in a condition of asphyxia or oligopnoea..28.75%

A personal record of thirty-five cases is given in which much bigger doses were administered, the average total amount being morphine sulphate \( \frac{17}{20} \) or well over half a grain;

- Hyoscine hydrobromide, approx \( \frac{1}{30} \) and atropine sulphate approx. \( \frac{1}{30} \).

The results obtained were, as regards the mother:-

- Complete/
Complete Amnesia ............... 94.3%
Almost Complete Amnesia ...... 5.7%

and as regards the child:

Born in a condition of asphyxia or oligopnoea...
42.85%.

The results, from the point of view of the mother, were therefore much better, and though by this method far more infants were born with respiratory embarrassment, none of these came to any harm.

For this reason it is contended that much more latitude may be allowed in technique than has previously been admitted to be safe. While one is not advocating large doses as the best or safest method, one submits that experiment along these lines would be worth while.

6) BIBLIOGRAPHY.


Bertino:— La Ginecologia. Vol IV.

Cremar:— Aertzliche Vierteljahres Rundschau. 1908


Flemming:— Modern Methods in Abnormal and Difficult Labour (1924) Chapter on "anaesthesia in obstetrics".

(4) Zentr. f. Gyn., 1907, p. 33 Nr. 2.


Guiseppi:- "Practitioner" July 1911.

Greenwood:- "Scopolamine - Morphine semi-narcosis during labour". 1913 (Oxford Medical Publications.)


Hellman: - "Twilight Sleep" (H.K. Lewis, 1915).

Hirschmann: - "B.M.J." 1922, P. 669.

Hocheisen: - "Münch. med. Woch." 1906, Mtrs 37 and 38 1907 Nr. 11.


Johnstone: - "practitioner" April 1917.

(2) Deut. med. Woch. 1905.
De Lee:— "Principles and Practice of Obstetrics". (1918).
McCull:— "Practitioner" Feb. 1912.
Raining:— "Frommel's Jahresber" 1904.
Siegel:— (1) München. med Wehnschr., 1913. No. 41.
(2) Deutsche med Wehnschr., 1914 No 21.
Solomons and Freelaland:— "B.M.J." Jan., 1911.
Steffen:— Arch.f. Gyn., Vol. 81, 1907, No 2.
Von Steinbuchel:— "Die Skopolamine Morphine Halb-
narkose der Gebertshilfe".
Williams:— "Obstetrics" - 1920.