- Geissler, J. (1939). *Klin. Wschr.*, **18**, 378.
 Grotepass, W. (1938). *Hoppe-Seyl. Z.*, **253**, 276.
 Günther, H. (1922). *Ergebn. allg. Path. path. Anat.*, **20**, i, 608.
 Hernando, T. (1938). *Biol. méd.*, Paris, **28**, 293.
 Kapp, E. M. (1939). *Brit. J. exp. Path.*, **20**, 33.
 — and Coburn, A. F. (1936). *Ibid.*, **17**, 255.
 Mackey, L., and Garrod, A. E. (1922). *Quart. J. Med.*, **15**, 319.
 — (1926). *Ibid.*, **19**, 357.
 Mason, V. R., Courville, C., and Ziskind, E. (1933). *Medicine*, **12**, 355.
 Mertens, E. (1937). *Hoppe-Seyl. Z.*, **250**, 57.
 Nebelthau, E. (1899). *Ibid.*, **27**, 324.
 Rimington, C. (1936). *Onderstepoort J. vet. Sci.*, **7**, 567.
 — (1938a). *Chem. and Ind.*, **16**, 1110.
 — (1938b). *C. r. Lab. Carlsberg*, **22**, 454.
 — (1939). *Proc. roy. Soc. Med.*, **32**, 1268.
 Saillet (1896). *Rev. Médecine*, **21**, 542.
 Salkowski, E. (1890-1). *Hoppe-Seyl. Z.*, **15**, 286.
 Turner, W. J. (1938). *Arch. intern. Med.*, **61**, 762.
 Vannotti, A. (1937). *Porphyrie und Porphyrinrankheiten*, Berlin.
 Waldenström, J. (1934). *Acta med. scand.*, **83**, 281.
 — (1935). *Dtsch. Arch. klin. Med.*, **178**, 38.
 — (1937). *Acta med. scand.*, Suppl. 82, pp. 1-254.
 — Fink, H., and Hoerbuerger, W. (1935). *Hoppe-Seyl. Z.*, **233**, 1.
 — and Vahlquist, B. (1939). *Ibid.*, **260**, 189.
 Watson, C. J. (1938). *Downey's Handbook of Haematology*, vol. 4, p. 2445, H. Hamilton, London.

CAUSES OF POST-PARTUM HAEMORRHAGE*

BY

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The causes of post-partum haemorrhage can be divided into two main groups. The first and larger consists of cases where an otherwise normal uterus has been treated unkindly by Nature or other agencies; the second includes cases in which there is some pathology or possibly a misplaced placental site.

Group I: The Normal Uterus

Many primiparae after a spontaneous delivery have cervical lacerations, a few of which extend above the level of the vaginal vault or have some degree of perineal laceration. It is a rarity for such cervical or perineal lacerations to give rise to alarming or dangerous bleeding. If, however, an incompletely dilated os is forcibly stretched by the premature application of forceps or an injection of pituitary extract, or by an accelerated breech delivery, the cervical lacerations are considerably increased, and indeed may assume the nature of a minor degree of rupture of the uterus. Too rapid stretching of the perineum by forceps or pituitary extract or by imperfect control of the head during a spontaneous delivery also results in severe trauma. It is surprising how seldom severe bleeding occurs even in these cases, although there may be considerable shock.

The most important bleeding point is the placental site. Prolonged or obstructed labours exhaust the uterine muscle and predispose to an imperfect third stage as regards the mechanism and control of bleeding. Mismanagement of an otherwise perfectly normal third stage is a prolific cause of difficulty and bleeding at this time. The uterus if well treated performs its work satisfactorily. At the Tarnier Clinic in Paris I noted that the women were delivered on their backs, and the resident doctor left them alone after delivery during the third stage. He returned from time to time to palpate the uterus. This procedure struck me as somewhat casual, and as different

from what is the general rule in this country, where the patient is usually delivered on her left side and may remain in this position for some time before she is turned on her back to await the separation of the placenta, and where massage of the uterus is often performed.

A study of some hundreds of cases of incomplete B.B.A.s on the hospital district, where the baby had been born but the placenta had not come away by the time the nurse arrived, showed that in only one instance was a slight post-partum haemorrhage reported. These women had no skilled attention before the arrival of the nurse or district doctor.

A series of cases injected with 1 c.cm. of pituitary extract immediately after the delivery of the baby, with a view to studying the effect on the third stage and the amount of blood loss, revealed that the only cases in which there was any trouble were those which had been allowed to remain unduly long on their side after the injection was given or in which the uterus had been massaged. It is well known that a uterus which is kept out of the pelvis either at laparotomy or by means of a full bladder tends to bleed. If a patient lies for long on her side before the placenta comes away the uterus tends to fall up into the abdomen, with disturbance of its neuro-muscular mechanism.

With the rarest possible exceptions I deliver patients in the lithotomy and cross-bed position aided by a Clover's crutch. Unless there has been a long labour and much anaesthetic has been used I do not allow anyone to touch the uterus, but proceed to repair any laceration or episiotomy wound which may be present and merely lightly palpate the fundus from time to time to determine if the placenta has separated. The third stage is uniformly most satisfactory, and there is a minimum of blood loss. The time factor is a most important one, especially at night. The time of delivery should be noted, and at least ten to fifteen minutes allowed to elapse—unless there is bleeding—before deciding whether the placenta is ready for expulsion or not.

Occasionally one meets with post-partum haemorrhage of an insidious nature if the placental separation is not going according to plan. This is most likely to be found if the patient is nervous or has had a long and tiring labour or a lot of anaesthetic. The placenta in these cases has left the fundus but has not yet been completely detached from the lower part of its site. The physical signs are misleading. An attempt at expression fails to deliver the placenta, but a mass of blood clot the size of a small orange is squeezed out. There is no active continuous bleeding, but merely expulsion of a mass of blood clot each time an attempt is made to express the placenta. Each clot represents several ounces of blood and the patient slowly deteriorates. It is a sound rule to remove these placentae manually while the patient's condition is good.

I have never seen sepsis arise where a manual removal of the placenta followed by an intra-uterine antiseptic douche was done while the patient was in fairly good condition. Delay in doing this owing to a dread of causing sepsis or because the blood loss is intermittent and slight, and not continuous and severe, is responsible for many bad results.

Group II: The Pathological Uterus

In the other group of cases there is some intrinsic mischief in the uterus. One such, a multipara, was referred to me as her two previous confinements had been

* Contribution to a discussion in the Section of Obstetrics and Gynaecology at the Annual Meeting of the British Medical Association, Aberdeen, 1939.

followed by a most profuse haemorrhage after the third stage was complete. I made a point of personally attending her in the maternity ward. After the labour and the third stage, which were perfectly normal, she suddenly started to bleed profusely from the placental site, which was checked only by prolonged bimanual compression and the injection of pituitary extract.

The explanation of such a case is extremely difficult, as the course of labour, and also the third stage, on each occasion appeared normal. This in my opinion would rule out disease and also deficient retraction. There was no suggestion of placenta praevia. I think it may be explained by an experience I had when curetting a patient who had been bleeding for many weeks following a miscarriage at the fourth month. The curetting was done with a sharp curette as there were no retained fragments. Following the curetting she bled so profusely and so persistently in spite of treatment that a vaginal hysterectomy was performed. Section of the uterus showed a large vessel the size of the normal uterine artery passing through the musculature to the placental site.

I suggest that some of those rare and unaccountable haemorrhages from an apparently normal and empty uterus may be due to the presence of some unusually large arterial trunks in close proximity to the placental site. Occasionally cases which have been treated for ante-partum haemorrhage of the accidental type have a serious post-partum haemorrhage. Fortunately, the more serious cases of this condition, especially where the bleeding is concealed, are operated on, and this enables the operator to estimate the extent of the damage to the musculature, and whether or not it is safe to conserve the uterus without risking a severe and fatal post-partum haemorrhage. Many of these cases, however, are dealt with by domestic measures and have a spontaneous delivery or one aided by forceps, and there is no way of assessing the condition of the uterus. In one such case where there had been some concealed haemorrhage the third stage concluded with a most profuse and continuous haemorrhage. It was quite impossible to perform bimanual compression, as the empty uterus lay relaxed and flaccid in the abdomen and no mass of muscle substance could be squeezed. She died before a laparotomy could be performed. All cases of accidental haemorrhage, especially of the concealed type, should, if possible, be dealt with in a nursing home or hospital.

In cases of placenta praevia there is always the risk of a severe post-partum haemorrhage, but fortunately it is a rarity. I have met only one such case which failed to respond to any of the usual routine procedures, including bimanual compression. In this connexion it must be borne in mind that the rapid extraction of a breech baby in such a case may very readily cause a tear of the cervix and lower uterine segment and result in profound and even fatal haemorrhage.

Conclusion

As regards the problem of post-partum haemorrhage in general, with the exception of the rarer conditions, if the uterus is handled properly it will very rarely give rise to anxiety on account of bleeding, and with the rarest possible exceptions an empty uterus will not bleed except from a cervical laceration. I am against packing a uterus. The rule is to empty the uterus if the bleeding is to be stopped. The pathological uterus which is deficient in contractile and retractile power is less likely to respond if it is distended. I never repair cervical lacerations, and would perform bimanual compression

followed by a hot douche in preference to packing if faced with serious bleeding from such a lesion. My experience of cases sent into hospital with the vagina reported to have been packed before admission would in itself make me opposed to advocating deeper tamponage.

I consider that many of the cases at present treated by blood transfusions would do equally well if they were given gum- or glucose-saline.

OPHTHALMIC INJURIES FROM MUSTARD GAS (D.E.S.)

BY

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Recent letters in the *Journal* are evidence of the interest taken in ophthalmic lesions due to mustard gas. I felt, in the circumstances, that certain information on this subject collected by me in the last few years might be acceptable to others. The table below is compiled mainly from figures in the *Medical History of the Great War*, already quoted in part by Sorsby. Thuillier (1939), while giving the total number of British mustard gas casualties as not fewer than 150,000, states that the total number of eye casualties is unknown. In the *Official History of the War:—Medical Services* (1923), however, it is stated that "the great majority of D.E.S. casualties had eye burns." Yet out of this large number only ten had persistent impairment of vision after the war—this number rising from recurrent corneal trouble to thirty-four in 1937.

Reagent Mustard	Grading	%	Onset	Physical Signs	Symptoms	Treatment	Incapacity
Vapour <1/10,000,000	Mild	75	2-48 hrs.	Conjunctival congestion	Irritation and photophobia	2% NaHCO ₃ solution; paroline; paper shade	1-4 weeks
Stronger vapour 1/20,000	Intermediate	15	2-48 hrs.	Ditto + chemosis	Ditto more severe	Ditto + 1% ung. atrop.	4-6 weeks
Concentrated vapour and liquid	Severe	10	Maybe almost immediate	Ditto + blistered lids and white band across cornea	Ditto	Ditto + treatment for infected ulcers and symblepharon	8-16 weeks

The burn is divided into three stages by Bonnefon (1939): the period of impregnation, the established burn, and the period of decrescence. It is the period of impregnation which is most interesting therapeutically, as once the burn is established there appear to be very few curative possibilities other than the treatment tabulated above. The difficulties in countering D.E.S. in the period of impregnation are as follows:

1. *Liposolubility*.—The gas is even more readily absorbed by the cornea than by the skin, and Sorsby (1939) has stated that if "drops" of liquid D.E.S. are placed experimentally on both corneae of a rabbit, and one eye is irrigated, the lesions are identical in both next day.

2. D.E.S. is relatively insoluble in water.

3. Except for its peculiar and specific intracellular reaction it is not an active substance chemically. Dichlormethyl sulphide and $\alpha\alpha$ -dichlorethyl sulphide are equally liposoluble,