

THE SURGICAL USES OF OZONE.

BY GEORGE STOKER, M.R.C.P. IREL., M.R.C.S. ENG.,
MAJOR, ROYAL ARMY MEDICAL CORPS.

THE accompanying tabulated statement of the results of the first 21 cases treated by ozone at the Queen Alexandra Military Hospital cannot be regarded as anything but satisfactory from every standpoint, be it humanitarian, scientific, or economic. The cases were, for the most part, those of cavities and sinuses in the femur and tibia. It is the experience of those who have seen a great deal of war surgery that such cases obstinately resist treatment and are apt to remain unhealed for months and years.

The treatment consists of the application of ozone to the affected parts; it is, therefore, necessary to have an apparatus for generating ozone which shall be portable and easily worked. The one I am accustomed to use is known as Andriolis' ozoniser. It is called into operation by a four-volt battery animating a $\frac{1}{4}$ -inch sparking Rhumkorff coil. The oxygen passes from a cylinder through the ozoniser, and in doing so comes in contact with a metal armature, the effect of this being to transform the oxygen into ozone.

Table of Wounds, Sinuses Treated by Oxygen and Ozone.

No.	—	Nature of disability.	Pre-vious duration.	Dura-tion of treat-ment.	Result.
1	J. B., Lincolns.	Compound comd. fracture of femur resulting in cavity $1 \times 1\frac{1}{2}$ inches and sinus $1\frac{1}{2}$ inches deep.	20 mos.	2 mos.	Cure.
2	W., Lincolns.*	2 large surface wounds on forearm 5×4 .	6 wks.	2 "	"
3	H. E. B., E. Surreys.	3 sinuses opening from back of scapula, each 6 inches long.	9 mos.	2 "	"
4	G. G. T.	Ulcer on end of stump.	3 "	3 wks.	"
5	M., K.O.R.L.	Wound on shoulder.	10 "	4 "	"
6	M.	Sinus in tibia $1\frac{1}{2}$ inches deep.	12 "	7 "	"
7	H. D., Scots Guards.	Ulcer on instep.	$2\frac{1}{2}$ "	3 "	"
8	A. A. A., Canadians.	Cavity and sinus in femur, $2\frac{1}{2}$ inches deep.	14 "	2 mos.	"
9	F. G. B., Grenadier Guards.	Two sinuses in leg, one 8 and one 5 inches long.	8 "	1 mth.	"
10	J. W., Grenadier Guards.	Cavity in finger after whitlow.	3 wks.	8 days.	"
11	P. V., Suffolks.	Cavity and sinus, 2 inches deep, in left humerus.	14 mos.	3 wks. & 3 days.	"
12	G. C., R. Fusiliers.	Sinus in stump after amputation.	6 "	5 days.	"
13	T. C., D.L.I.	Wound in shoulder below clavicle, leaving sinus $2\frac{1}{2}$ inches deep.	4 "	16 "	"
14	Major M., R. Inniskilling Fusiliers.	Sinus in lower end of outside of R. humerus $1\frac{1}{2}$ inches deep.	10 "	5 "	"
15	J. G., Seaforth Highlanders.	Ulcer in centre of amputation flap.	9 "	3 wks.	"
16	Sister N., Q.A.M.N.S.	Large opening at back of right ear following 2 operations for mastoiditis.	7 "	3 "	"
17	W. B., Lifeguards.	Suppuration of eye socket after enucleation of eyeball.	6 "	3 "	"
18	Lieut. B., R. Warwicks.	Sinus leading down to right femur, 2 inches deep.	7 "	3 "	"
19	Lieut. R., Canadian Inf.	Trench gingivitis with ulceration of gums.	3 wks.	3 "	"
20	W. M., Hants.	Sinus and abscess cavity in amputation stump.	6 mos.	5 "	"
		Total	157 mos. 2 wks.	18 mos. 2 wks.	

* In this case treatment was discontinued for four weeks.

N.B.—I have only failed in one case, Major S. H. He was twice plated for fracture of the femur. The "plate" acted as a "foreign body."

The properties of ozone, which have a wonderfully healing effect, are, as far as one can say at present, three:—

1. It is a strong stimulant and determines an increased flow of blood to the affected part.

2. It is a germicide, which destroys all hostile micro-organic growth.

3. As the French chemist Hennocque has shown, it has great powers in the formation of oxyhæmoglobin.

The ozone is applied on the wounded surface or to the cavities and sinuses for a maximum time of 15 minutes, or until the surface becomes glazed. Ozone has the particular power of disclosing dead bone, foreign bodies, septic

deposits, &c. This, I believe, it does by destroying the granulations and micro-organic growths (presumably unhealthy) that are found in close contact with septic deposits, foreign bodies, or dead bone.

Cleansing and Dressing.

Wounds and sinuses, &c., are washed twice daily with boiled water and a dressing of dry gauze is applied. It must be observed that at first ozone causes an increase of the discharge of pus; later on the pus is replaced by clear serum, which at a still later stage becomes coloured reddish or pinkish. In open wounds it is necessary to strip off the parchment-like film surrounding the edges, which is composed of oxidised serum. This is easily effected by applying a hot compress for 15 or 20 minutes, after which the film can be easily peeled off with a dissecting forceps.

At present our knowledge of the effects of ozone is but small, but later I hope to bring before the medical public further satisfactory facts with reference to its working and results.

Clinical Notes:

MEDICAL, SURGICAL, OBSTETRICAL, AND THERAPEUTICAL.

PLACENTA PRÆVIA AND CÆSAREAN SECTION.

BY A. G. TRESIDDER, M.D. LOND.,

CAPTAIN, INDIAN MEDICAL SERVICE; STAFF SURGEON, POONA.

ONE meets only a few cases of placenta prævia in which the condition of both mother and child justifies the operation of Cæsarean section. This is more especially so in hospital practice, where such patients are usually admitted in a more or less advanced stage of labour and only after there has been a considerable loss of blood, a state of affairs which would obviously contra-indicate a major operation when other means of delivery are open to us.

In recent years it has been recognised that the best treatment for certain cases of placenta prævia is Cæsarean section, and the results obtained among these carefully selected cases have been very satisfactory both as regards the maternal mortality and that of the infants. The maternal mortality of placenta prævia treated on the ordinary lines is 4 to 8 per cent., and the average foetal mortality is 60 per cent. Munro Kerr says: "The best figures give 4 per cent. and 35 per cent. respectively, and they are as low as one can ever expect to reach with the present recognised methods of treatment." But in certain cases of placenta prævia, such as the one described below, Cæsarean section would, I think, justify us in expecting much better results than a maternal mortality of 4 per cent. and a foetal one of 35 per cent.

As regards the mothers, there seems no special reason why Cæsarean section performed in suitable cases of placenta prævia should not yield quite as good results as it does in cases of contracted pelvis, when the operation is performed under the best conditions, the maternal mortality then being 2.9 per cent. (Amand Routh). Berkeley and Bonney place the maternal death-rate of Cæsarean section, when this operation is performed under the best conditions, as "probably under 1 per cent." In well-selected cases of placenta prævia the maternal mortality should not, therefore, be greater than about 2 per cent., i.e., about half as great as we could expect from any other method of treatment. One other great advantage to the mother is a lesser risk of morbidity as compared with that which results from the necessary manipulations, often prolonged, which accompany delivery *per vias naturales*.

The foetal mortality must obviously be very greatly reduced by Cæsarean section, and the rate of 35 per cent. at the best would be reduced to one of about 5 per cent. Further, in most cases the mother should be as well able to nurse her infant as after normal delivery, a result which, because of some slight sepsis or as the result of hæmorrhage before and during delivery, is often denied to the mother who has been otherwise delivered.

Generally speaking, the operation of Cæsarean section in a case of placenta prævia is indicated under the following