and after recovery from wound infection, I have records of 13 cases in which, on a subsequent test, some change was detected in the haemagglutinin content of the blood serum. In all cases the change was either from a negative to a positive reaction, or from a low to a high degree of haemagglutinin content. This generally coincided with a healthier condition of the wounds and with improvement in the general health of the patients.

Nephritis.

I have also tested the haemagglutinative capacity of the blood serum against my own red cells and those of the sheep in 50 cases of nephritis. Of these a second examination has been made, after an interval, in 25 cases, and a change in haemagglutinative capacity was observed in 15. In 7 cases a negative was converted into a positive reaction, and in 8 from a lower to a higher haemagglutinin content as far as my own corpuscles were concerned. With the sheep's corpuscles 5 cases showed a change from - to +, and one from a lower to a higher degree of agglutinative capacity. In three cases only was the change in the other direction. In the first of these a ++ was converted into a - reaction with my corpuscles, the action with the sheep's corpuscles remaining the same—namely, negative. In the second the reaction with my corpuscles remained constant, namely, ++, but dropped from a positive to a negative reaction with sheep's cells. In the third case the human cell reaction fell from ++ to +, but with the sheep's cells the reaction rose from + to ++. The two blood examinations were made in nearly all cases at about a month's interval, and most of the patients were improving generally, with a diminution in the amount of albumin in the urine.

The interesting problem arises in these albuminuric cases whether any leakage of haemagglutinins goes on from the kidney along with the leakage of serum-albumin and globulin.

A somewhat extensive examination of the action of these albumin-containing urines on washed red cells failed to show any distinct evidence of haemagglutinative effect. Certain changes, however, occur in the red cells which I regard as initial stages in agglutination, but the reaction does not become complete owing possibly to physical or biochemical factors in the urine. A control experiment in which a known volume of agglutinating serum was diluted with urine in different proportions showed that distinct evidence of agglutination could be obtained in serums diluted up to 1 part in 10 with urine, even after standing for twelve hours. Different samples of healthy urine also vary in the degree to which they destroy the agglutinative capacity of a given serum. This variation in the urine of different individuals to degrade the blood serum is undergoing further investigation, and may possibly provide a test of urinary toxicity.

Patients suffering from albuminuria consequent on nephritis show, on the whole, a lower haemagglutinin content of blood serum than is found in a corresponding group of partly healthy persons. A series of fifty cases of soldiers suffering from nephritis and a series of fifty male patients whose blood was examined for the Wassermann reaction, in many negatively, gave the following results. The cases are arranged in series showing the haemagglutinative strength:

	+++	++	+	-	Total.
Nephritis cases ...	3	16	20	11	50
Wassermann cases...	13	12	22	3	50

If this reduced haemagglutinin content in nephritis cases is considered in conjunction with the rise in haemagglutinin content which takes place as the albuminuria diminishes and the patients recover, we are led to the conclusion that a leakage not only of serum-albumin and globulin but also of haemagglutinin does take place from the kidneys in nephritis. This is important, because if the blood serum is drained of haemagglutinin it may also be drained of other substances of the antibody group, and this loss may be associated with the lessened resistance to infection which is known to exist in these patients.

Conclusion.

In a considerable number of cases under conditions which require further analysis, but which seem to be associated with recovery from albuminuria in the nephritis cases, and successful resistance to general infection in the wound cases, a definite alteration has been found to occur in the blood serum, for the most part in the direction of an increased haemagglutinin content. The bearing of this fact on the problem of blood transfusion now becomes apparent. If the blood serum of a recipient may be at one time compatible with the red cells of a given donor, and at another time may agglutinate those cells, the donor's serum may also, as the result of recovery from infection or other illness, change in the same way.

Cases have been recorded by Major Robertson, Major Lee, and others, in which transfusion of blood from the same donor to the same recipient had no harmful effects on one occasion but was followed by death on a second. I venture to suggest that changes in the haemagglutinin, and probably in the haemolysin, content of the blood serum of the recipient or donor or both occurred in the interval between the two transfusions, which were responsible for the unfortunate result.

GENERAL ANALGESIA BY ORAL ADMINISTRATION.*

BY

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AND

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THIS report is in the nature of a preliminary communication based on animal experiments and a sufficient number of clinical cases to support the conclusions of the animal work. It will be seen that general analgesia in which there is loss of sensation, with or without loss of consciousness, can be established for otherwise painful dressings and for short operations. The desirability of such a procedure becomes apparent immediately on entering a military hospital, and it has also a definite place in civil surgery.

Many war wounds are accompanied by fractures of bones, and the importance of keeping such patients quiet is universally recognized. If the dressing of such a wound is accompanied by severe pain, it is customary at this base to produce nitrous oxide-oxygen or light ether anaesthesia for at least the first few dressings, necessitating in most cases, because of limitation of apparatus, removal of the patient to the operating room. This usually means pain and the danger of misplacing the bone fragments before and after dressings, as well as loss of time to surgeons, nurses, and orderlies. General analgesia, produced simply and quietly without taking the patient from his bed, is the logical solution of this difficulty, and the technique evolved as the result of this study makes it possible to administer the analgesic by mouth in perfect safety. It is, of course, applicable to practically all forms of painful dressings, and is being developed to embrace short surgical operations, such as resection of a rib, removal of foreign bodies, revision of wounds. In such operations, however, it may be necessary to supplement the analgesia with novocain for the skin incisions, a hypodermic injection of morphine, or even by light inhalation anaesthesia.

Local conditions made it seem advisable to select rabbits as the animals for the preliminary work. The animals were tied to a board and the various substances given by stomach tube, after which the animals were immediately released and placed under observation.

Quinine and Urea Hydrochloride (Nikalgin):

Weight of Animal.	Amount.	Result.
2200 gni. ...	4 c.cm. }	... No systemic effect.
2105 " ...	8 c.cm. }	
2250 " ...	16 c.cm. }	
1795 " ...	30 c.cm. }	
2215 " ...	60 c.cm. }	{ Unable to stand after 10 minutes and died in 8 to 17 hours.

* Aided by grants from the American Red Cross.

Trional (dissolves in alcohol, 1 grain to 1.5 c.cm.):

Weight of Animal.	Amount.	Result.
2230 gm. ...	1 grain	Reflexes active.
2470	3 grains	Reflexes abolished in 1 hour; still on feet.
2175	6 grains	Reflexes abolished in 45 minutes, remaining so for 5½ hours; full recovery in 8 hours.
2460	9 c.cm. alcohol (control)	Reflexes partly abolished.

Morphine Tartrate (in water):

1810 gm. ...	½ grain	No appreciable effect.
2560	2 grains	
2000	3 ..	
2053	4 ..	

Paraldehyde:

1710 gm. ...	2 c.cm. ...	Dropped in 15 minutes, slept 4 hours; not analgesic.
2220	4 c.cm. ...	Dropped in 15 minutes; analgesic 6 hours; complete recovery.
	6 c.cm. ...	Died in 15 hours.

Ether in Olive Oil, 50 per cent.:

2430 gm. ...	5 c.cm. ...	Reflexes only partially inhibited, never off feet.
2170	15 c.cm. ...	Reflexes partially inhibited.
2420	30 c.cm. ...	Reflexes completely abolished; apparently full recovery. On repeating dose next day, animal died in 30 minutes. Necropsy showed dilated stomach, with congestion, erosion, and sub-mucous petechiae.
2053 gm. ...	20 c.cm. ...	Reflexes abolished in 6 minutes; apparently complete recovery in 1 hour 16 minutes. Killed after 24 hours, and necropsy showed same findings as in preceding animal.
2095 gm. ...	25 c.cm. ...	Reflexes abolished in 5 minutes; apparently complete recovery in two hours. Killed after 24 hours, with same result as in preceding animal.
—	30 c.cm. olive oil without ether	No effect. Killed after 24 hours, and showed same condition in stomach as preceding animals.

Ether in Olive Oil, 25 per cent.:

Animal.	Amount.	Result.
No. 1 ...	30 c.cm. ...	Down in 12 minutes; reflexes not abolished.
No. 2 ...	20 c.cm. ...	Inco-ordinate.
No. 3 ...	10 c.cm. ...	No apparent effect.

All three animals were killed after twenty-four hours; stomach not dilated, fundus much congested and covered with much adherent mucus.

Paraldehyde plus 25 per cent. Ether in Olive Oil:

Weight of Animal.	Amount.	Result.
2100 gm. ...	1 c.cm. paraldehyde	No effect.
1880	10 c.cm. ether in olive oil	Down in 5 minutes; reflexes partially inhibited; practically restored in 10 minutes. Recovery in 25 minutes.
2170	Combination of above	Down in 5 minutes. Reflexes practically abolished in 10 minutes. Recovery in 30 minutes.
1950	Paraldehyde 2 c.cm. and 25% ether in olive oil 20 c.cm.	Down in 5 minutes; slept for nearly 2 hours.
2060	25% ether in olive oil 20 c.cm.	Down in 5 minutes; slept for 1 hour.

Other Combinations:

Weight of Animal.	Amount.	Result.
2000 gm. ...	Morphine tartrate 1 grain Ether ... 2.5 c.cm. Albolene ... 7.5 c.cm.	All inco-ordinate, but no other effect.
1955 gm. ...	Morphine tartrate 1 grain Paraldehyde 1 c.cm. Albolene ... 2 c.cm.	
	Paraldehyde 1 c.cm.	
2110 gm. ...	Ether ... 3.75 c.cm. Albolene ... 11.25 c.cm.	

These experiments were not conducted as experiments on the detailed physiology of analgesia, but simply for the purpose of demonstrating that analgesia can be produced by oral administration of proper agents. As will be seen, various combinations of drugs were not especially successful, and in rabbits the best results were obtained by the use of ether in oil. It was found, however, that this mixture produced acute gastritis in the animals, but further investigation showed that olive oil alone produced quite as severe a gastritis as when combined with ether. Knowing that olive oil is practically non-irritant to the human stomach, it was considered safe to proceed with the investigation on man. It was thought, however, that some mineral oils might be even less irritant in man, and accordingly the menstruum was changed to either liquid paraffin (albolene)

or Russian mineral oil. The fact that there are said to be ether drinkers in Ireland and France who apparently suffer no more than alcoholics, made it seem additionally safe to try the mixture of the two for clinical work. Additional support was drawn from the fact that in many hospitals ether is being applied as a local dressing without deleterious results. Finally, a 65 per cent. solution of ether in oil has been used in many thousands of cases of oil ether colonic anaesthesia without any sign of local irritation to rectum or colon, as has been proven by proctologic examination, as well as by the fact that no case of dysentery or bloody diarrhoea has been observed.

Clinical Data.

The following combinations have been tried clinically:

I. Ether	Liquid paraffin ...	āā fl3 iv
	Aq. menth. pip. ...	m v
II. Paraldehyde	50 per cent. ether in albolene ...	fl3 j to iij
	Aq. menth. pip. ...	q.s. ad fl3 j m v
III. Ether	Albolene ...	fl3 iijss
	Aq. menth. pip. ...	fl5 iv m v

The mixtures containing paraldehyde were disagreeable to the taste and smell, the ether oil very much less so, but the difficulty was soon overcome by following a suggestion by Major W. E. Lower. One ounce of port wine is placed in a glass and the analgesic in another glass. The patient takes a mouthful of wine, holds it for about thirty seconds, rinsing the mouth so as to get the aroma in the upper air passages and the taste well established, and then swallows the wine. The ether mixture is then taken and is followed immediately by the remainder of the wine. Several wines and liqueurs were tried but port wine was found to be the most satisfactory. One of us (J. T. G.) and several other physicians have taken this "Lower sandwich," and have found it not disagreeable and to produce analgesia. As will be seen from the following notes, numerous patients have been given it with excellent results. Only one patient has been nauseated, a man who was violently opposed to taking the wine. As opposed to that case it was given to another man, who had repeated attacks of vomiting, immediately after an attack. His dressing was done without pain, and his vomiting ceased permanently. All the cases have been able to take food and water shortly afterward, and even in patients much exhausted by infection there have been no deleterious after-effects. It was soon found that the paraldehyde served no useful purpose, and most of the dressings have been done with Formula I. While it is well not to give the analgesic immediately after a meal, no especial preparation of the stomach is necessary.

Under the general direction of Major W. E. Lower, the following cases were dressed in No. — (Lakeside, U.S.A.) General Hospital, American and British Expeditionary Forces, by Lieutenants B. I. Harrison and W. R. Barney. All the dressings were done without removing the patient from the ward.

CASE I.

Soldier, aged 35. Gunshot wound of right thigh, and infected compound comminuted fracture of femur. Previous dressings had been very painful, and the splint could not be changed without general inhalation anaesthesia. Given: Paraldehyde fl3 j, ether fl3 iij, liquid paraffin q.s. ad fl3 j. In fifteen minutes fell into a light sleep. The wound was dressed, splint removed, through-and-through wound irrigated with ether, gauze drain inserted down to femur, and Thomas splint applied with extension. The patient talked during the dressing, felt practically no pain, and suffered no nausea or other ill after-effects. The dressing was repeated in a similar manner every other day for four dressings, and in none of them was there pain or any alteration of pulse or respiration.

CASE II.

Soldier, aged 28. Gunshot wound of left thigh, with compound comminuted fracture of femur. He was given same mixture as Case I, and fell asleep after twelve minutes. The Thomas splint was removed and replaced, gauze packing removed, wound irrigated with ether, and another gauze pack reinserted. The patient groaned when the pack was reinserted, but after regaining complete consciousness said that he had felt no pain during the dressing. Three subsequent dressings were done on alternate days with no nausea or other after-effects, nor alteration of pulse or respiration. The patient complained of the taste of the mixture, but said it was far to be preferred to the extreme pain of the dressings.

CASE III.

Soldier, aged 23. Gunshot wound of left leg—compound comminuted fracture tibia and fibula; through-and-through infected wound. He was given the same mixture as Case I, fell asleep after fifteen minutes and slept for thirty minutes, during which the dressings were done. Thomas splint repadded, packing removed and reinserted; ether irrigation. Two dressings were done without ill after-effects.

CASE IV.

Soldier, aged 39. Gunshot wound of left thigh, through-and-through, with compound comminuted fracture of head of femur. All previous dressings extremely painful. Given paraldehyde fl3 ij, ether, albolene, aa fl3 ij. Wound cleansed, packing removed and reinserted. The patient groaned at one time, but had no later recollection of having had pain. The pulse increased from 108 to 110 and respirations from 26 to 28. No nausea. Three subsequent dressings on alternate days were equally painless and without ill after-effect.

CASE V.

Soldier, aged 23. Gunshot wound of right leg, infected; compound comminuted fracture of tibia. Dressings very painful. He was given same mixture as Case I; dressing done with much less pain than before; the pulse rose from 100 to 116, and respiration from 24 to 26. A few days later the dose was repeated, and the patient slept through the dressing. No ill after-effects.

CASE VI.

Soldier, aged 27. Gunshot wound of thigh; streptococcus infection. No fracture. Given morphine tartrate gr. 4, ether fl3 ij, albolene fl3 ij, paraldehyde fl3 ij. Multiple superficial incisions were made for drainage with very slight pain, probably because of dressing following too soon after administration of mixture. The pulse rose from 110 to 120. The patient was vomiting before the mixture was given, but retained it and did not vomit afterwards.

Several other dressings are briefly summarized in the accompanying table.

Following the above experiments, one of us (J. T. G.) was ordered to a casualty clearing station. The following cases from the service of Captain D. C. Taylor, R.A.M.C., illustrate some of the possibilities of the method:

Two almost parallel cases of penetrating wounds of the knee occurred on November 15th. Case I was given the usual inhalation ether anaesthesia with the Shipway apparatus; Case II was given 1 oz. of 50 per cent. ether in liquid paraffin. Thirty minutes later a supplementary 2 drachms of chloroform were given by inhalation during the operation. The knee-joint was opened, pieces of comminuted patella removed, the joint irrigated with saline and closed. Both cases rested quietly for one hour after operation. Case I then complained, and required a hypodermic injection of morphine for the control of restlessness and pain. About the same time Case II awakened, drank some milk, and fell asleep again. Both patients slept until breakfast time. Case I drank some tea, but refused other food. Case II had tea, porridge, and bread-and-butter. Neither vomited afterwards, and both were evacuated to a base hospital in about four hours.

Two other cases of Captain Taylor's were given each a double dose of the mixture (2 oz. 50 per cent. ether in liquid paraffin). Each required only a few additional drops of inhalation anaesthesia. The resultant analgesia after operation was a little more prolonged than with inhalation anaesthesia. One of these patients was ready for operation in ninety seconds, and required 1 drachm of chloroform, given drop by drop, to "carry on" an operation lasting thirty minutes.

The substitution of chloroform for paraldehyde has been found to make even a more satisfactory mixture than the

preceding. The following formula has been used in approximately thirty cases:

Chloroform	...	...	...	fl3 ss to j
Ether	...	...	...	aa fl3 ijss
Liquid paraffin	}	...	...	

It is not recommended at the present time to exceed this. It is our opinion that the toxic effect of this small amount of chloroform can be disregarded in military surgery.

Discussion.

The physiology of "general analgesia" by oral administration has not been subjected to an exhaustive investigation, but certain important facts should be borne in mind by those who contemplate using the method outlined. The oil and ether mix perfectly, and do not separate into layers. Baskerville has shown the rate of evaporation from minute to minute to be constant, so as to form a straight oblique line when plotted out. This holds true with different percentages of ether in the oil, in all cases assuming a constant temperature and exposed surface. It is therefore impossible for the patient to get an overdose at one time and an insufficient amount at another time. The total amount is not absorbed at one time; if it were, the administration of 2 ounces of 50 per cent. ether in oil would produce complete anaesthesia, as there would be liberated 1 ounce of ether. Only a light analgesia is obtained which, for operative procedures, must usually be supplemented in some way. Naturally, the surface for evaporation is greater in the stomach than is the case in the colonic method, and the absorption of ether more rapid. The total amount that may be given with safety by this method has not yet been determined. It is considered advisable for the present to supplement the method either by local anaesthesia or the administration of small amounts of anaesthetic by inhalation. But it is important to remember that the patient is as safe by this method as if the ether were in a container outside the body. All anaesthetics are analgesics, and before the danger zone is reached the patient must become anaesthetized; hence the patient in the analgesic stage is separated from the danger zone by the period of anaesthesia. We consider analgesia by this method as safer than any method of anaesthesia. If the anaesthetist carries his patient to the "blear-eyed" snoring stage, he defeats the object for which this special method was devised, the object being to take advantage of the analgesic stage of any and all anaesthetics used. If adopted it would release from the routine of administration of anaesthetics a certain number of physicians who now, in military hospitals, devote their entire time to that work.

CONCLUSIONS.

It is felt that in so far as one can do so in a preliminary communication of this sort the following conclusions are justified:

1. General analgesia is safer than general anaesthesia.
2. Fifty per cent. ether in liquid paraffin or other bland oil is probably the safest general analgesic, has apparently no deleterious effect upon the stomach, and is not followed by the nausea and vomiting that frequently accompany inhalation anaesthesia. Its effect may be enhanced by the addition of a small amount of chloroform (fl3 ss to j). It may be given without unpleasant taste when "sandwiched" between mouthfuls of port wine.
3. The method is especially indicated during the dressing of painful wounds without taking the patient from his bed.

Nature of Dressing.	Administra- tion.	Time of Dressing.	Result.	Pulse.	Respiration.	Pupils.	After-effects.
Deep wounds of both legs; deep drains	2.32 p.m.	2.50 p.m.	Good	B. 81 ... A. 84	B. Normal	No effect	None.
Large excised painful back wound	2.32 p.m.	2.48	No pain	92 ... 112	"	"	Nauseated and vomited.
Stump, adherent dressings (three times)	3.03	3.30		120 ... 100	32 ... 20	"	None.
T.-and-T. wound leg, with drain	10.00	10.20	Good	No change	No change	"	None.
Abscess leg, multiple in- cisions	10.00	10.20	Good	"	"	"	Patient cried out but remained flaccid. Had little pain.
T.-and-T. drain leg	11.00	11.15	Poor	"	"	"	Only half dose given. Patient jumped and had pain.
Stump dressing	11.15	11.30	Fair	90 ... 95	"	"	Patient cried out, but had less pain than when done before.
Drains, foot	fl3 ss*						

* Had no effect whatever.

B. = Before; A. = After.

or ward, and, when supplemented, can be employed for surgical operations.

Note.—Our thanks are due to the medical director and members of the staff of No. — (Lakeside, U.S.A.) General Hospital, who have co-operated in this work. Major Alexander Lambert, Medical Director of the American Red Cross in France, on whose personal staff one of us (J. T. G.) had the pleasure of serving, has in many ways stimulated the working on this problem, and we take pleasure in expressing our warm appreciation of his interest and help.

THE EFFECT OF A DEEP HELD INSPIRATION ON THE MURMUR OF SLIGHT AORTIC REGURGITATION IN YOUNG SUBJECTS.

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I wish to draw attention to what I believe to be an undescribed clinical phenomenon—namely, the marked diminution or complete disappearance of the diastolic murmur of aortic regurgitation (in young subjects with only slight regurgitation) when a deep breath is taken and held.

The well recognized disappearance of a systolic murmur at or near the heart's apex under similar conditions has often been regarded as evidence in favour of such a murmur being exocardial—"cardio-pulmonary" as it has been called—rather than endocardial. Certainly some murmurs, reasonably diagnosed as "cardio-pulmonary," because most audible over areas in which lung tissue overlaps the heart, varying obviously in intensity with the phases of respiration, ceasing in recumbency, not following the usual rules of "conduction" of mitral murmurs, although heard at or near the heart's apex, do disappear when a deep breath is taken and held. But recently I have been led to wonder whether other murmurs, due to real mitral lesions, may not also disappear in similar fashion. Of such I cannot now speak with any confidence, but it is at least interesting to discover that an actual organic murmur like that of aortic regurgitation may also lessen or vanish during deep sustained inspiration. The three following cases have all been seen, and my conclusions verified, by valued colleagues, so that the truth of my observations does not rest on my own unsupported statements.

CASE I.

Pte. G., aged 19, had a well-marked aortic regurgitant murmur whose area of audibility is indicated approximately in Fig. 1. There was no doubt about this murmur; pulmonary regurgitation is an excessively rare condition, and, in my experience (limited to cases of malignant endocarditis), has a murmur well heard over the upper left front of the chest, where this was not heard. The lesion was clearly slight, for the radial pulse was not "water-hammer," and there was no visible pulsation up to the ears in the neck. The heart's apex beat was in the fifth space, a little outside the left mammary line, when the patient was upright, and it was rather diffuse. The limits of the cardiac dullness were:

<i>Standing.</i>	<i>Recumbent.</i>
Right edge: $\frac{7}{8}$ in. to R. of midline	$\frac{3}{4}$ in. to R. of midline.
Left edge: $4\frac{1}{8}$ in. to L. of midline	$4\frac{1}{4}$ in. to L. of midline.

There was no other murmur in any position. Curiously, the weather seemed to make a difference in the effects of inspiration, as I note below. On December 30th, during very cold weather, I noticed that the murmur was almost obliterated when the patient took and held a very deep breath, whether examined in the erect or recumbent position. On expiration the murmur returned. On December 31st, the weather being warm and mild, the deep held breath entirely obliterated the murmur. On January 1st, a warm day, the murmur at the sternal junction of the fourth left rib cartilage was entirely lost on taking and holding a deep breath; in recumbency a sharp reduplicated second sound remained. On January 9th, a warm

day, the murmur was quite lost in the erect position, but not quite lost in the recumbent position, when the deep breath was taken and held.

CASE II.

Driver W., aged 26, admitted August 19th, 1917, with slight aortic regurgitation, and slight double mitral murmur. Fig. 2 shows approximately the area of audibility of the aortic murmur. There was no doubt of the nature of the murmur, there being no murmur heard over or to the left of the pulmonary artery. The lesion was slight, judging by the almost complete absence of pulsation in the neck and the character of the radial pulse.

The diastolic murmur quite disappeared on taking and holding a very deep breath in the erect position, and nearly disappeared in the recumbent position.

FIG. 2—M, Approximate area of audibility of murmur, standing. C, Cardiac dullness, standing. o, Position of stethoscope during observations.

CASE III.

Pte. R., aged 20, admitted November 18th, 1917. I found presystolic and systolic mitral and a soft diastolic aortic murmur. The pulse was not water-hammer, and there was no pulsation to the ear in the neck. On taking and holding a deep breath the diastolic murmur diminished distinctly, not immediately but by degrees, and, on releasing the breath, returned, but more quickly. I believe the same gradual disappearance of the murmur occurred in the other cases also. On November 25th, at the level of the fourth left costal cartilage (showery stormy day) the diastolic murmur quite disappeared on holding a deep breath. On December 1st it quite disappeared, equally in erect and recumbent positions. The condition is illustrated in Fig. 3.

FIG. 3—C, Cardiac dullness, standing. o, Position of stethoscope during observations.

Case I was seen by my colleagues, Dr. Clapp and Dr. Gates; Case II by Dr. Williamson and Dr. Gates; Case III by Dr. Williamson and Dr. Gates.

With regard to possible explanations, mere extra overlapping with lung could not have concealed the murmur, for the second sound, which preceded it, remained quite clear. My idea has been that perhaps the negative pressure set up in the thorax by the deep inspiration partly neutralized the elastic recoil of the aorta, thus lessening the force producing the regurgitation; and that, further, seeing that the effect developed not at once but gradually, the increased volume of the pulmonary capillaries in deep inspiration delayed the entry of blood into the left side of the heart, and produced a rather less full aorta. If these theories are correct they will help to explain the influence (if real) of weather, since on a cold day the aortic tension may perhaps be higher, owing to constriction of surface vessels, than on a warmer day.

It is, however, not to this attempt at explanation, but to the phenomenon itself, that I desire to draw attention.

THE CONSERVATIVE SURGERY OF THE HAND AS ILLUSTRATED BY A CASE OF TENDON GRAFTING.

BY

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It will readily be granted that although the work of the instrument maker in making artificial limbs is excellent, nothing yet invented can take the place of the human hand or even of a thumb and one or more fingers. There are at the present time many cases coming before surgeons doing military work in which the possibility of saving even one finger has to be seriously considered.

The purpose of this paper is to show the possibility of tendon grafting, which I think must have escaped the memory of orthopaedic surgeons, as I have not seen it made use of in any of the hospitals I have inspected