part of the lens behind. A bloodless field can be ensured by the use of adrenalin; the form of operation must depend on the experience of the operator and on his familiarity with the various methods of operative procedure. Personally I favour the Barraquer operation, using atropine to dilate the pupil and avoiding trauma to the iris by doing a simple extraction. The incidence of iritis in a series of 115 Barraquer operations which I did in 1924 was 3 per cent(7). In the above series of cases the incidence of iritis following the intracapsular operation was 6.2 per cent.; following the capsulotomy operation 19.4 per cent. Too much stress cannot be laid on such figures because of the very large number of intracapsular as compared with capsulotomy operations performed. What is much more instructive as revealing the source of the post-operative inflammation is the fact that, both after the intracapsular and the capsulotomy operations where capsular remains were left behind, the percentage of iritis was equal in both cases, approximately 27 per cent. and that capsular remains, together with the retention of blood in the anterior chamber accounted for 50 per cent. of all the cases of post-operative inflammation.

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PRACTICAL POINTS IN BLOOD GROUPING AND THE SELECTION OF DONORS FOR BLOOD TRANSFUSION.*

By R. B. LLOYD, M.A., M.B., B.Ch.,

MAJOR, I.M.S.,

Imperial Serologist.

Blood transfusion has now an established place in the treatment of many conditions, particularly of course grave hæmorrhage. There are occasions when transfusion of blood will save life when nothing else will do so, consequently the selection of donors becomes a matter of the first importance.

Extensive recent researches have made it clear that the problem of the four blood groups is not quite so simple as was imagined a few years ago. The chief recent additions to our knowledge may be classed under two headings:—

(*a*) Evidence of the existence of more than four groups, or at any rate of individuals whose blood grouping reactions do not conform in all particulars to those of the four well-known groups, i.e., abnormal types. (*b*) Evidence of the existence of unusually high iso-agglutinin titre in certain group IV donors (universal donors).

It is not proposed in this short paper to enter fully into details, but the question will at once be asked by the surgeon:—Is the value of these blood grouping tests as a safe guide to transfusion thereby impaired? The answer is that blood grouping tests should invariably be done where possible, but the results must always be checked by direct matching tests, owing to the occasional presence of abnormal types. As a result of the newer information it may definitely be stated that no donor can be considered absolutely satisfactory unless he be of the same group as the recipient. Consequently the recipient and the proposed donors should be grouped, and a donor of the same group as the recipient selected. If a donor is used who is of the same group as the recipient, one is transfusing into the patient something very like his own blood—unless an abnormal type be present which would be detected by the matching test—and no reaction other than slight pyrexia from the citrate, if the citrate method be used, is to be anticipated. There is usually time even in a case of grave hæmorrhage for complete tests to be made. If standard grouping sera are not available, the same result can be reached in another way. If the patient's blood be drawn and separated into serum and cells, and the same is done with the donor's blood, then the patient's cells can be tested for agglutination against the donor's serum and the donor's cells against the patient's serum. If both these reactions are negative for agglutination then the two persons tested are of the same group. A study of Moss' table shows that this is so. This method of testing is known as direct matching. It is not possible to find out by this means what the group of the patient is, unless one of the bloods be known in advance. This is not essential, however, and the direct matching test has the great advantage of showing up abnormal types which grouping may fail to detect.

In very grave cases where something must be done within a few minutes, there may be no time for grouping and direct matching tests, and it is then a perfectly justifiable proceeding to use a professional group IV donor *who has been used before without bad results.* The absence of bad results on previous occasions shows that his serum agglutinins are probably not present in abnormally high titre; and the use of his blood as a donor to a patient of undetermined group, although not so strictly correct as the transfusion of the blood of the recipient's own group, is perfectly justifiable in an emergency. Hundreds of such transfusions from universal donors have

*In this article the Moss terminology is used throughout.

been given without any bad results. If, however, the 'universal donor' is merely known to be group IV and has never before been used as a donor, the position is not quite so simple, as instances have occurred of group IV persons whose agglutinins are present in abnormally high titre. Should this be the case, transfusion of the blood of such donor may result in sufficient agglutination of the recipient's cells to produce a serious reaction. If this 'universal donor' has been used before 'without bad results' to a recipient of another group it shows that the donor's agglutinating titre is not abnormally high, being sufficiently overcome by the dilution which the donor's blood undergoes during transfusion. Ordinarily it is not possible to know the group of a recipient into which blood from a universal donor has been previously transfused, for where grouping tests are available universal donors would not be used. As 45 per cent. of Europeans and 30 per cent. of Indians are of group IV, all the previous recipients of this particular donor's blood might have been of group IV, i.e., his own group, in which case no reaction would follow. This particular donor might nevertheless on account of high agglutinating titre be dangerous when transfused into persons of I, II & III groups. Hence the use of a universal donor should be limited to cases in which nothing better is possible. Fortunately these group IV donors with high agglutinating titre are rare.

Where there is time, the suitability of a group IV universal donor ought always to be checked by a direct matching test, and if the direct matching test be doubly done, i.e., patient's cells against donor's serum and *vice versa,* we have seen above that it is possible to determine that the donor and the recipient are of the same group: even though we shall not by this method find out what the group is. "Where an emergency transfusion has to be done, and no grouping is possible it is safer to depend on a direct matching test than on a universal donor without a direct test, and it is justifiable to depend on a direct test alone," (Levine & Mabee, 1923).

Blood for grouping should be obtained by pricking the end of the well ligatured finger exactly midway between the anterior and posterior surfaces and between the two lateral borders, i.e., exactly in the middle of the end of the finger. If successfully done the puncture will hit off the anastomosis between the two digital arteries and a plentiful supply of blood will be obtained. The first portions should be received into a dry watch glass and allowed to clot, and the serum obtained. The rest should be milked into a small test tube containing one c.c. of normal saline, and the tube inverted several times over the bleeding finger. The blood thus quickly diluted does not clot, but if some time is to elapse before the tests are done, it is advisable to use citrated saline. The standard method of grouping is by two known sera of groups II and III. A drop of each of these is placed on a different part of a slide, and a drop of the corpuscle suspension added to each, the mixture stirred up with a glass needle and set aside under a cover to prevent drying. With sera of good titre the reaction will be complete within 5 to 10 minutes. The reaction consists in the formation of aggregations of red blood cells which are obvious to the naked eye, looking like fine brick dust.

Serious mistakes can arise if either or both of the grouping sera have lost power. It will be seen from Moss' table that if the blood under examination be group II, and the group III serum used has lost power, the blood when tested will give a negative result with both group II and group III sera. It will, therefore, appear to be group IV, whereas in reality it is group II. If this blood, wrongly grouped as IV, is regarded as that of a universal donor and is transfused into a patient, it may produce very grave symptoms and possibly a fatal result; unless the recipient should happen to be group II, i.e., the same group as the real group of the donor.

Moss' Table of Blood Groups.

	Serum of Group I.	Serum of Group II.	Serum of Group III.	Serum of Group IV.
Cells of group I.	○	+	+	+
Cells of group II.	○	○	+	+
Cells of group III.	○	+	○	+
Cells of group IV.	○	○	○	○

+ denotes agglutination.
○ denotes no agglutination.

To avoid grave errors of this kind it is essential to make certain that the sera used are active.

Our practice is to test the unknown blood cells first against known group IV serum. A negative result shows that the unknown group is IV, provided the serum is of good titre. A positive result on the other hand shows that the unknown blood is either I, II or III groups. Then we proceed with the standard group II and III sera. If both results are positive the unknown blood group is I. If group II serum alone agglutinates, the unknown is III; and *vice versa* if group III serum alone agglutinates, the unknown is II. If neither serum agglutinates, the unknown blood is group IV. Having obtained any one of these four results, it is next

necessary to check the grouping sera used. To do this, it is necessary to have cells of known groups in the laboratory; these keep from two to three days in saline in the ice-box, but it is preferable to have living supplies of cells in the shape of persons of known groups in the laboratory. Finally, having obtained a donor of the correct group it is essential to confirm the suitability of the donor by direct matching tests. If this shows positive agglutination an abnormal type is present. Abnormal types are rare, but it is always necessary to be on one's guard against them. The serologist who reports on a blood group incurs a serious responsibility, and no precaution which can possibly be taken ought ever to be omitted. Recent experience has shown that it is not advisable to rely on grouping tests alone.

The actual technique of these tests is simple, but it is necessary to have a thorough understanding of the subject, and to institute full controls. No opinion as to a group should ever be based on negative results alone; e.g., let us suppose unknown blood cells when tested against group II and III sera give negative results in both cases. The unknown blood is then group IV. To confirm this negative result, take the serum of the unknown and test against known cells of I, II and III groups. Positive agglutination should be obtained in each case. If they do not all agglutinate, the unknown is not group IV, and one of the standard group II and group III sera in the first test has lost power.

The correct practice then according to our present knowledge is to proceed as follows:—

(1) The best technique is to group both donor and recipient. Choose a donor of the same group as the recipient, and confirm both the correctness of the grouping and the absence of abnormal types by a direct matching test.

(2) If No. I method be not possible, it is best to take a universal donor and check by direct matching.

(3) If neither of the above methods be possible it is justifiable to depend on a direct matching test alone. In such a case it should be done doubly as explained above.

(4) The least satisfactory method is the use of a universal donor without a matching test. This should never be resorted to if it can possibly be avoided.

The result of recent research has been to emphasise the importance of direct matching tests, rather than placing absolute reliance on grouping tests alone.

Coca (1918) has criticised the ordinary methods of grouping on the grounds (*a*) that they are artificial tests as serum is tested against diluted cells, and (*b*) that they are not quantitative. He has introduced an ingenious technique for full details of which the reader is referred to the literature. The principle is the testing of the citrated whole bloods of the donor and recipient one against the other, the donor's blood being diluted ten times so as exactly to imitate *in vitro* the effect of a transfusion *in vivo* of 500 c.c. of blood from the donor into a recipient who has a total blood volume of approximately 5,000 c.c. The dilutions are carried out in a hæmocytometer white cell counting pipette. The method further shows, in the case of incompatibility whether it is the donor's serum which is agglutinating the recipient's cells or *vice versa*.

Choice of donor.—The ideal donor is a man 20 to 30 years old, free from every kind of disease and with prominent veins in the antecubital fossa. Men are preferable to women. The latter are more liable to anæmia, and their veins are apt to be small and buried in fat: 500 c.c. of blood is a convenient amount to withdraw. Any healthy man can tolerate this without inconvenience, and it is seldom necessary to transfuse more. No donor should ever be selected who is feeling even *slightly* unwell as he may be commencing one of the specific infectious disorders, which might thus be communicated to the recipient. Where repeated transfusions are to be made into the same recipient, *e.g.*, in a case of pernicious anæmia, it is preferable to use a different donor each time; as apparently in certain cases something akin to sensitisation occurs which may lead to undesirable reactions. The mechanism of this is not fully understood.

The question of the communication of diseases by blood transfusion is an important one, though there may be no time in a grave emergency to make elaborate tests for these. The most important disease is syphilis, and wherever possible a Wassermann test should be carried out on the donor. A single negative Wassermann reaction is of course not certain proof of the absence of syphilis, but it is the best that can be done. The communication of malaria, kala-azar and filariasis has also to be considered.

Parents and children are not by any means necessarily of the same blood group. These blood characters are hereditary, and are inherited according to the Mendelian law. Thus if two parents be of group II their children will be either group II or group IV; so that the blood of either parent if transfused into their group IV child would be incompatible. If the child were group II all would be well. Where the two parents are of different groups the children may be of any group.

There is some evidence that skin grafts, should they be taken from another person, 'take' better if the donor and the recipient of the graft be of the same blood group. Should a skin grafting of this kind be contemplated it is always worth while having the blood groups examined.

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A Mirror of Hospital Practice.

A CASE OF PLEURISY WITH EFFUSION.

By AWAT T. SHAHANI, M.B., B.S.,
Medical Officer, J. W. Dispensary, Karachi.

Isardao Lokumal, aged 51 years, a clerk in the Customs Office, came to this dispensary on the 1st November 1925, complaining of fever, cough, pain all over the body and sore throat. The symptoms appeared to be typical of influenza; he was treated for this complaint, and in a week's time appeared to have recovered.

Four days later I was called in to see him in his house as he was complaining of breathlessness. On examination he appeared to be suffering from asthma. There was no pain in the chest, the temperature was normal and the pulse 84. He was kept on anti-asthmatic mixture, but with no improvement.

On the 16th November I was again called in to see him. To my surprise I found that his chief symptom was pain in the *abdomen*, with breathlessness; the heart was pushed downwards and far to the left of its normal position; the temperature 100°F.; pulse 140. On the right side of the chest there was dullness extending from the third costal interspace downwards. The patient complained of a painful tumour in the epigastrium also; this on examination proved to be the liver, which was pushed downwards. The condition was thus obviously one of pleural effusion into the right pleural cavity, although the patient had never complained of pain in the chest.

Blisters were applied to the right side of the chest and a mixture containing magnesium sulphate, potassium iodide and digitalis given. His condition did not improve and on the 20th November the chest was aspirated. About two pints of clear straw-coloured fluid was withdrawn, and 2 c.c. of this was injected subcutaneously into the abdominal wall. The patient had an irritating cough after the aspiration, but the right side of the chest was now strapped and a mixture given containing potassium iodide, digitalis, nux vomica, and stimulating expectorants, together with purgatives when necessary. Fortunately the pleural cavity did not refill, and recovery was rapid; within two months his condition was normal.

Points of interest in the case are:—(1) Pleural effusion as a sequel to what appeared to be typical influenza, with early symptoms of breathlessness but no pain. (2) The insidious onset of the condition. (3) Its rapid progress, since the right pleural cavity appeared to have filled with fluid during the interval between November 16th and November 20th; and (4) his rapid recovery; the chest did not refill and there was no collapse of the costal parietes.

I am much indebted to Dr. V. E. Nazareth, M.D., who assisted me with this patient.

A TUMOUR OF THE SCROTUM AND GROIN SIMULATING AN IRREDUCIBLE INGUINAL HERNIA.

By Capt. M. K. PILLAI, B.A., M.B., C.M.,
Civil Surgeon, Pegu, Burma.

The patient, a South Indian Tamil, aged 41 years, working as a cultivator in Burma, was admitted to the Pegu Civil Hospital with a large, elongated tumour of the right scrotum and groin of about 15 years' duration. The scrotal portion of the tumour was hard and slightly tender, the inguinal portion soft, fluctuating, tender and slightly inflamed, with a constriction at its lower part simulating strangulation. The tumour, according to the patient, started about 15 years previously and used to get small or big according as he was regular in his bowels or constipated. For the last year it had been getting bigger. Five days before admission he was constipated and the tumour became larger, more tender, with nausea and loss of appetite. On admission his temperature was 99.4°F. and pulse 100 per minute.

A provisional diagnosis of irreducible inguinal hernia with hydrocele was made and he was operated upon under chloroform anæsthesia the day after admission. On opening the inguinal canal, it was found to contain a hydrocele of the cord. This was removed and the cord was found to be intensely congested, purple in colour and very much thickened. There was no hernia. On examining the testis, it was found hard, very much enlarged, as big as a large *bael* fruit with enlarged veins on its surface. It was diagnosed as a teratoma of the testis and castration was performed and the wound closed up. The patient made an uninterrupted recovery and was discharged cured in a fortnight.

A CASE OF APPARENT ABSENCE OF THE UTERUS.

By J. B. VAIDYA,
MAJOR, I.M.S.,
District Medical Officer, Kurnool.

Mrs.——, married, aged 25 years, came to consult me, complaining of very scanty menstruation and inability to conceive. She stated