like agterlikheid, mikrokefalie, optiese atrofie en serebrale
verlamming.

We express our appreciation to Professor J. G. A. Davel for his
guidance and assistance with these cases.

REFERENCES

CERTAIN ASPECTS OF TRANSFUSION UNDER PRESSURE
J. LEVIN, B.SC., M.B., CH.B. (CAPE), D.A. (ENG.), D.A. (IRE.)
St. George’s Hospital, London

Increased use is being made of positive pressure for
blood replacement by the intravenous route. Not only
is it a suitable means of transfusion where blood loss
has resulted in venous collapse or spasm, but it is proving
useful for rapid repletion of blood volume after severe
haemorrhage during thoracic, and in particular cardiac
and vascular, surgery. Coupled with this is the develop­
ment of intra-arterial transfusion as an improved means
of resuscitation.1-3 A sure and safe method of avoiding
air embolism is of prime importance. This has prompted
the description of a simple piece of apparatus which is
coming into common use for positive-pressure trans­
fusion.

THE DANGER OF AIR EMBOLISM

The existing type of drip feed used in transfusion
apparatus lends itself to the danger of rapidly fatal air
embolism when positive pressure is applied to the
transfusion bottle.4, 5

The commonest way in which air embolism has
occurred is as a result of air being forced into the tubing
after the level in the transfusion bottle has reached the
level of the outlet tube. The precaution of keeping a
continuous watch on the fluid level is not enough, for
there is another less obvious means by which air
embolism may result, which is demonstrated by the
following case report.

Case Report. B.W. aged 54 years. Left pneumonectomy for
extensive bronchiectasis. Because of considerable pleural adhesions,
operating time was prolonged and blood loss necessitated the
transfusion of 8 pints of blood, aided by positive pressure from a
double bellows. A constant watch was kept on the transfusion
bottle. When about 200 ml. of blood remained in the 5th bottle,
it was noticed that a mixture of blood and air was entering the
drip feed, despite the fact that the pressure in the bottle was restored
to atmospheric level by disconnecting the bellows. The blood level
in the dripper dropped completely. The tubing was immediately
removed where it joined the intravenous needle, and a new trans­
fusion set up. The patient suffered no untoward reaction.

On examining the apparatus it was found that, when it was
allowed to flow, a short column of pure blood was followed by a
mixture of air and blood. This mixture continued to flow despite
the fact that the bottle was about half full and although no positive
pressure was applied. When the ‘wick’ filter which had been con­
tinuously used for the previous 4 pints of blood and half of the 5th
pint was examined, it was found that the mesh had been partially
blocked with sediment. This caused the blood outside the ‘wick’
filter to dam up and the blood within the confines of the filter
drained away and was replaced by air.

Dolten et al.6 in 1945, reported on a similar occurrence,
with a fatal result, due to this type of air embolism
caused by a partially blocked filter. They pointed out
that fatalities, in fact due to this type of air embolism,
may in the past have been mistaken for status
lymphaticus, acute cardiac failure, shock, and the like.

It must be stressed that this progressive blockage of
the filter by sediment, with its attendant danger of air
embolism, readily occurs when gravity alone is employed
to transfuse blood. The danger may be avoided by
regular renewal of the filter in the course of prolonged
transfusion.

Apparatus

Fig. 1 illustrates the conventional transfusion
apparatus designed so that positive pressure may be
safely applied.

The glass drip-chamber is replaced by one which
contains a float. The lower end of the float and the lower
end of the drip-chamber are so ground as to create an
airtight fitting when they come into contact with each
other. The tubing and drip-chamber are filled in the
same way as the ordinary apparatus. Details of this
’safety dripper’ are illustrated in Fig. 3. The side
tube allows for pressure equalization when the clip is
opened. This permits the level of the float to be set at
any desired height above its seating.

Fig. 2 indicates what occurs when the transfusion
bottle empties. Air forced into the drip chamber causes
the fluid level to drop. The float then sinks onto its
seating, sealing the apparatus off from any further flow,
and thus air embolism is prevented.

A screw cap, the top of which has been holed to allow
passage of the glass inlet and outlet tubing is shown in
Fig. 3. Figs. 1 and 2 show the purpose of this cap,
which is to hold the rubber cork firmly in the rim of the bottle so that any excess of pressure will not blow cork, tubing and filter out of the transfusion bottle. This cap must be deeper than the usual screw cap, so as to accommodate the protruding part of the rubber cork and at the same time take a good grip of the rim of the bottle.

Positive pressure is obtained by the use of a double hand-bellows (Figs. 1 and 2), which allows an even and adequate head of pressure to be maintained. No other method, such as the employment of an oxygen cylinder, is advisable.

For intra-arterial transfusion all metal and rubber joints should be secured by wire. Also an 'aneroid' type of pressure gauge may be coupled (by a 'Y' tube) to the double bellows to indicate the pressure in the transfusion bottle.

Testing of the Safety Dripper. In view of the less-known cause of air embolism (due to a partially clogged filter) we tested the reaction of the float mechanism when a mixture of blood and air entered the upper end of the drip chamber. The entry of such a mixture caused the float to fall with the receding fluid level in the drip-chamber. Any further flow was prevented as effectively as when air alone entered from the drained transfusion bottle.

In a further experiment carbon dioxide dissolved in saline at a pressure of 80 mm. of mercury was run through the apparatus. This solution immediately on reaching the drip-chamber again caused the float to-
prevent any flow. Here the gas is released from solution and depresses the fluid level and the float with it.

OTHER ASPECTS

Rate of Blood Flow. 1-3 Jones 8 has recently emphasized that the size of the bore of the transfusion needle is the main factor limiting the volume transfused where gravity is the force employed. Where positive pressure is used a large-bore needle is just as important.

Instead of a large-bore needle, polythene tubing of 1.5 mm. bore may be used, in the following manner: The tubing is introduced by threading it through a suitable cannula. It is then passed up a few inches along the length of the vein, allowing it to reach a vein of wider lumen. The advantages are obvious. Little splitting of the limb is required and there is minimal risk of dislodgement from the vessel. The use of polythene tubing is also most satisfactory where large quantities of blood or packed cells are to be administered over a long period.

Venous spasm or collapse is commonly encountered as a result of massive haemorrhage. Here, however wide the bore of the needle, positive pressure will be essential to assure adequate transfusion, if irreversible shock is to be avoided. Flow rates of 75 to 350 ml. per minute have been safely maintained under positive pressure via the arterial or venous route. Experience, however, has shown that for maximum safety the total volume replaced in this way should not be more than 70% of the estimated volume lost through haemorrhage. Where jugular tracings have been taken in these cases, they have shown no undue increase in venous pressure.

Where surgical procedures are undertaken which involve sudden grave loss of blood, a reasonable estimate of the quantity lost may be made by weighing all swabs before and after use. All clots removed from the wound and all blood taken up by the suction apparatus must of course also be weighed. Thus replacement volume for volume is much more accurately and beneficially achieved.

Intra-arterial Transfusion. Those contemplating the use of intra-arterial transfusion must be fully aware of the possible complications (apart from air embolism) which beset this newer method of resuscitation. Complications include the effect on the myocardium of the excessive plasma potassium in stored blood. Then there is the possibility of small blood-cell emboli reaching the arterial system. There is also the risk of ischaemia of the member distal to the site of arterial cannulation. Seeley and Nelson 4 and Melrose and Wilson 3 have exhaustively discussed this subject; Devitt and Wigderow 9 report on a successful case of intra-aortic transfusion. These reports are well worth careful study.

SUMMARY

Attention is drawn to the danger of partially clogged blood-transfusion filters which may allow a mixture of blood and air to enter the patient’s circulation and cause fatal air embolism.

A description is given of a simple apparatus for safe positive-pressure transfusion. The apparatus was tested under different conditions to prove its efficacy.

Means of achieving a satisfactory rate of flow, and the quantities transfused under positive pressure, are discussed.

A warning is given of the possible dangers of intra-arterial transfusion. These may be avoided if the literature available on the subject is studied.

Thanks are due to Dr. George Edwards, Head, Department of Anaesthesia, St. George's Hospital, for permission to publish the case report.

REFERENCES


FUNGAL DISEASES IN SOUTH AFRICA

H. I. LURIE, B.Sc., M.B., Ch.B.

South African Institute for Medical Research, Johannesburg

In recent years there has been a world-wide increase of interest in medical mycology. Innumerable articles have been written and several text-books have been published. In some of them the information on the incidence of fungal diseases in South Africa is erroneous or misleading. For example, Conant et al. 1 do not include this country in the geographical distribution of benign Histoplasmosis. They report Madureomyosis in Africa but not specifically in South Africa. Langeron 2 has omitted South Africa in the distribution of Torulosis and states that 3 cases of Rhinosporidiosis have been reported from this country.

No fault attaches to the authors. The reason is that after the first report of certain diseases it was thought that no useful purpose would be served by publishing subsequent cases. However, it now appears advisable to publish the incidence of various mycoses in South Africa.

The figures given below are based entirely on the specimens received at this Institute during the past 8 years. This laboratory serves a limited area and the number of specimens handled by other laboratories is unknown to the author. Moreover, the large majority of cases of the dermatomycoses are diagnosed clinically,