DIE LAMMBLUT-TRANSFUSION BEIM MENSCHEN

By: Dr. O. HASSE

A TRANSLATION OF PAGES 70-77 BY PHIL LEAROYD

‘EXECUTION OF THE TRANSFUSION’ AND ‘APPARATUS FOR INDIRECT TRANSFUSION’

The book ‘Lamb blood transfusion in humans’ by Oscar Hasse was published in 1874 in St. Petersburg (by Eduard Hoppe) and Leipzig (by Franz Wagner). A copy of this 78 page book can be viewed or downloaded from the following websites:

https://wellcomecollection.org/works/ffgrga74

https://books.google.co.uk/books?id=IUtW6247-ygC&pg=PP7&source=gbs_selected_pages&cad=1#v=onepage&q&f=false

I have translated two sections of this book, ‘Execution of the Transfusion’ (pp. 70-74) and ‘Apparatus for Indirect Transfusion’ (pp. 75-77), as I believe that the first contains historically interesting information regarding the author’s own method of transfusing lamb’s blood to human patients and the second because it contains a description of his own syringe transfusion device used for the indirect transfusion of defibrinated blood.

The first section provides practical details of performing a direct transfusion of lamb’s blood using a tube connection between the lamb’s artery and the patient’s vein – essentially the same methodology as that used by Denis and Lower approximately two centuries earlier! In the second section the author admits that his apparatus, designed for the indirect transfusion of defibrinated blood, has ‘the greatest similarity to Mosler’s apparatus’, being essentially a screw-plunger syringe. The method of its use is also described.

Note: The larger part of this book includes detailed notes of Hasse’s transfusion research work that is of limited historical interest.

I have produced a translation of these sections of Hasse’s book from the original German into English to enable its content to be appreciated by a wider audience. Whilst I am aware that instantaneous computer generated translation is available, this process struggles with accurately reading the original text and interpreting specialist terminology, as well as producing a ‘colloquial style’ not always representative of the original text. In addition, an ‘automatic translation’ may either purposely or inadvertently alter the wording to ‘make it read better’ but in doing so there has to be an element of interpretation involving something on the lines of ‘I believe that this is what the author is actually trying to say’. I want to avoid that as much as possible and try to present what the author actually wrote and as a result the reader may find that the English text does not ‘flow’ as well as it could. Although I have taken great care in accurately identifying the original text and producing a true representative translation of the author’s original wording I cannot guarantee that this work does not contain ‘translational errors’ and the reader is recommended to check specific details against the original text.

The paragraph settings and general layout of each of these two sections have been maintained although the actual size and positioning of the figures used within them has been altered to accommodate the layout of the translation presented below. Please note however that the original text identifies that “Figures 8, 9 and 10 are shown in half linear size” and that “the tip of the glass syringe is drawn too wide and the capsule drawn too narrow”. I have not included these comments in the translation below as I am not able to exactly reproduce the illustrations as originally printed.

Oscar Hasse (1837-1898)
(Image credit: nordhausen.de)

OSCAR HASSE – BIOGRAPHICAL INFORMATION

Oscar Hasse was born on the 13th March 1837 in Quedlinburg, the son of the preacher Ferdinand Hasse and his wife Johanne (née Fessel). He studied medicine at the universities of Greifswald and Berlin. In Greifswald he became a member of the Corps Pomerania in 1857. In 1861 he received his doctorate in medicine and worked as an assistant at the Bethanien Hospital in Berlin where he was involved in the first tracheotomies. He was a pioneer of blood transfusion initially of the use of defibrinated human blood. In 1873, inspired by Franz Gesellius, her began to use lamb’s blood to transfuse to humans and became staunch supporter of this operation, even when its dangers and uselessness had already been proven. Oscar Hasse was the founder, chairman and honorary chairman of the Nordhausen Harz Club. From 1864 until his death on the 14th February 1898 he was a practicing physician in Nordhausen. Additional information on Oscar Hasse can be found at:

https://www-nordhausen-de.translate.goog/allgemein/cblock_lang.php?CBlNr=11508&_x_tr_sl=de&_x_tr_tl=en&_x_tr_hl=en&_x_tr_pto=sc

Die

Lammblut-Transfusion

beim Menschen.

Erste Reihe: 31 eigene Transfusionen umfassend.

Von

Dr. Oscar Hasse,

practischer Arzt in Nordhausen am Harz.

Mit 10 Holzschnitten.

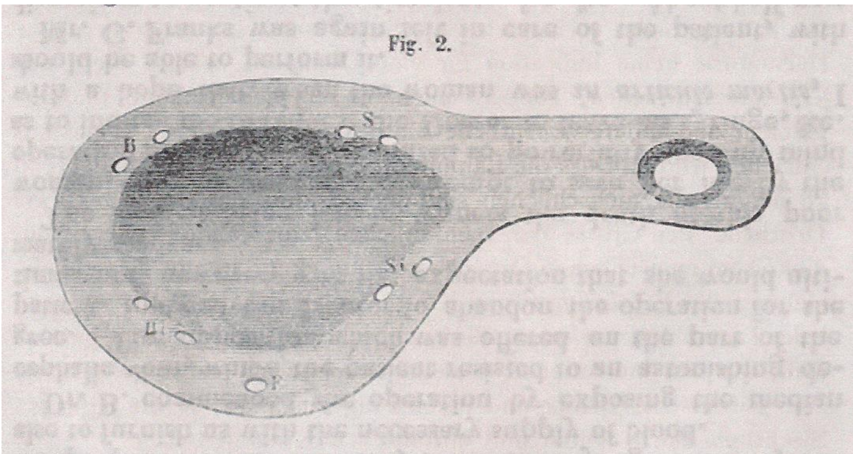
St. Petersburg, Verlag von EDUARD HOPPE. 1874. Leipzig, In Commission bei FRANZ WAGNER.

Title page: Die lammblut-transfusion beim menschen, by O. Hasse (1874)
(Image credit: Wellcome Collection)

EXECUTION OF THE TRANSFUSION

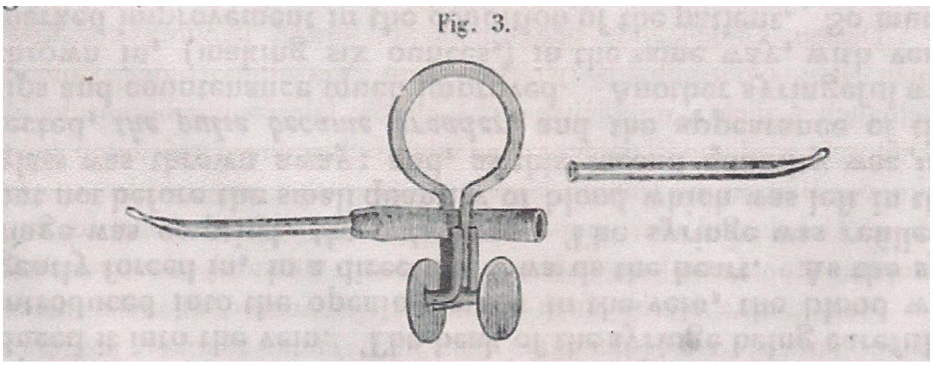
The execution of the operation is not a difficult one, but I would also like to warn against considering it too easy. In the latter, the careful observation of so many details is concentrated in a short period of time, which requires a greater tension on the part of the surgeon than is the case with many other operations, even difficult ones, the individual acts of which follow one after the other.

To prepare the lamb's carotid artery, the front side of the neck is shaved free of the wool, then all four feet of the animal are tightly tied together and the animal is tied to a board of the shape shown.



A double loop is pulled through the holes at B and B1 to fix the pelvic ring, and through the holes at S and S1 a double loop is pulled to fix the shoulder ring. At F, the laced feet are tied to the board. The protruding parts of the head, - the eye with orbital rim and zygomatic arch - come to rest in the circular cut-out K and the head is also tied here by a double loop that runs on both sides of the eye. So the animal cannot move and yet the sling does not impair respiration and circulation anywhere.

With a coarse scalpel, a 7 to 8 centimetre long skin incision is made at the front edge of the sternocleidomastoid muscle, and then one penetrates between the trachea and the said muscle to the carotid artery by tearing the very loose connective tissue with the fingers or between two forceps, and carefully cutting through the thicker fascia with the hollow probe. Since the walls of the venous and arterial vessels of the lamb are very soft and easily torn, careless preparation can easily result in disturbing bleeding. After the carotid has been completely exposed to an extent of 4 to 5 centimetres and isolated from the vagus nerve, it is ligated on the peripheral side and, while an assistant compresses it centrally, it is cut with a fine curved pair of scissors, and then the buttoned glass cannula (Fig. 3) is inserted and tied off.



Glass cannula in combination with rubber hose and pinch tap

Then the patient, who, if he can be out of bed, sits down in a comfortable armchair with a small table at the side on which his forearm rests; the vein is exposed through a 4 to 5 centimetre long skin incision, prepared completely free, tied on the peripheral side, and while an assistant compresses it slightly on the central side, it is cut with fine curved scissors, and a buttoned and filled glass cannula (Fig. 3) is also tied into it.

For the carotid artery I choose glass cannulas with a slightly thicker and more button-shaped tip, and for the vein I choose glass cannulas with a slightly finer and more spindle-shaped tip.

The board with the lamb on it is now placed on the small table on which the patient's arm rests and the narrow part with the animal's neck comes to lie opposite the arm wound so that the two short rubber tubes on the glass cannulas touch each other. Now the pinch tap is removed from the rubber tube of the lamb cannula, and as soon as the blood flows out of this tube, the rubber tube is also removed from the cannula located in the vein and the former rubber tube is slipped over this cannula.

If the cannulas are free of blood clots, the transfusion is now underway. During this process, very young lambs or lambs that have already been weakened by blood loss can be positioned slightly higher than the human arm, according to the advice of Gesellius

If the transfusion is to be stopped, the glass cannula is pulled out of the human vein, while the ligature with which it is tied is held in place with the fingernails. The spindle-shaped swelling of this cannula allows such an extraction without first releasing the ligature. The blood flowing out of this cannula is now collected in a measuring glass in order to control the amount of blood transfused, unless it is preferred to use the same animal immediately for a second transfusion.

Despite filling the glass cannulas with warm alkaline solution and keeping them as warm as possible, it sometimes happens that arterial and venous blood penetrates into the narrower part of the cannula and clogs it due to clotting.

The best way to prevent this problem is to move the pinch tap, which is used to close the rubber tube, as close as possible to the glass cannula. This means that the elasticity of the rubber tube, at the expense of which the blood penetrates into the cannula, is eliminated as much as possible. But once this problem has occurred, the clogged cannula must be removed and replaced with another one.

One could find this a disadvantage of the rubber hose in general; however, this can be avoided quite a bit and on the other hand, the use of the rubber hose brings with it many advantages and conveniences.

I cannot confirm Gesellius' claim that the rubber tube promotes the clotting of the blood with the rubber tubes I used. On the contrary, in the experiments carried out along these lines, the blood in the rubber tube remained liquid for a few minutes after it had already coagulated solidly in the glass cannulas connected to it. However, I always paid particular attention to the selection of rubber tubes; the most suitable ones seemed to me to be those with a diameter of 9 millimetres, whose lumens were 4 millimetres wide and whose walls were 2.5 millimetres thick, and which were made of red rubber.

Regarding blood clotting, I would like to mention a few other observations. I think I have found that the clotting of the blood is prevented when the blood is under a certain pressure, such as that exerted by elastic walls; or even better, if it is subjected to alternating compression by minimal pumping movements. If I compressed the lamb's carotid artery after the end of the transfusion, the contents of the cannulas still in situ clotted much more quickly than if I interrupted the flow by holding the mouth of the cannula pulled out of the human vein. It was almost strange to me how long I could allow the blood to stagnate in the cannulas in this way without disturbing the free outflow, as soon as I just removed the closure of the mouth of the cannula. –

It is also important for the coagulation of the blood whether the tube walls that enclose the blood column have been touched by the blood for the first time or whether they have already been washed by it for some time. In the former case, when the blood stagnates, coagulation occurs very quickly, and even previous irrigation with warm alkaline solutions cannot significantly prevent this. In the second case, however, the coagulation takes longer to occur.

I have never had to pay special attention to the patient's arm wound, which was created for the purpose of the transfusion. After the transfusion, the vein is also ligated on the central side, the piece where the cannula was attached is excised and the skin wound is closed with strips of adhesive plaster. The latter often remain in place for 6 to 8 days. I then always found the wound scarred apart from two small granulating areas, which corresponded to the vein ligatures. After the ligatures were removed, which in some cases only took place after 4 to 5 weeks the wound healed completely very quickly.

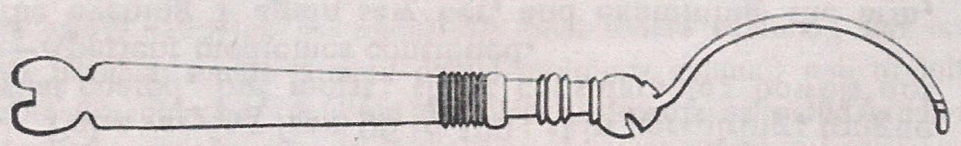
Phlebitis has never been seen.

With regard to my apparatus for direct lamb blood transfusion, I only have to make up for the fact that the rubber tubes are 5 to 6 centimetres long and the glass cannulas are 6 to 7 centimetres long. The thickness diameter of the latter is 4 millimetres. The lower end of it is bent at obtuse angles over a length of 1 to $1^1/_2$ centimetres, tapers here to 2 millimetres and less and has the spindle-shaped swelling at the tip. The upper end also has a wreath-shaped, rounded swelling, which makes it easier to push the rubber hose over and helps to fix it.

There are also two pinch taps included in the apparatus.

I also had very wide silver ligation needles (Fig. 4) made for this operation, which have proven very useful for isolating the artery and vein. The entire apparatus is easily transportable because of its small size (1).

Fig. 4.



Ligation needle.

(1) Such a small apparatus, containing 6 glass cannulas, 6 rubber tubes, 3 pinch taps, and 1 silver ligation needle with a bony handle, costs two thalers from the mechanic Ockert in Nordhausen.

APPARATUS FOR INDIRECT TRANSFUSION

Finally, I would like to discuss my device for indirect transfusion.

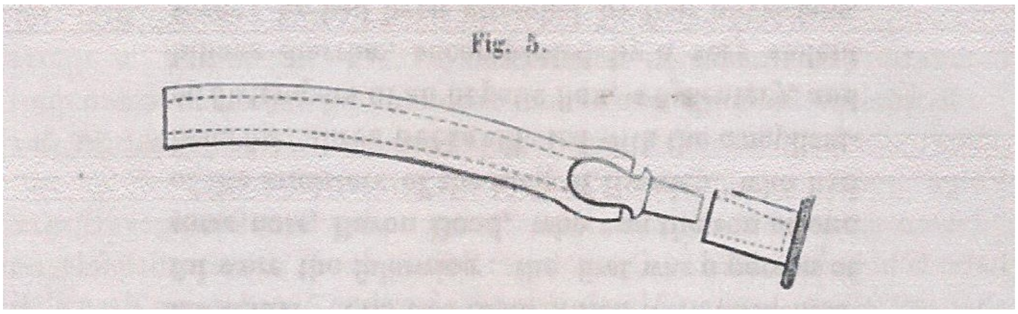
In my treatise mentioned at the beginning I described a modified Martin's apparatus. It has subsequently undergone many improvements.

I kept the glass boot of the syringe with an olive-shaped tip. The upper open end of this boot has been surrounded with a wide brass ring on which there are two opposite buttons. A pierced brass cover is pushed over this in the manner of a bayonet lock and secured by turning it sideways. A movable screw nut is attached to this cover, in which the piston rod, which has a double left screw turn, moves up and down. The movement of the piston rod is caused by rotation of the screw nut provided with a grooved washer; however, after opening the bayonet lock and removing the cover, the piston in the syringe boot can also simply be pulled up and pushed down or removed completely.

The piston itself consists of a solid cylinder made of cast rubber, which is pierced by the piston rod and can be screwed together more tightly using rounded brass plates on both sides, and therefore thickened as desired. This makes it possible to create an easier or tighter movement of the piston in the glass boot. The rubber piston fits into all the inequalities of the glass boot, so that with its help even less carefully cast glass syringes can be used.

In order to prevent the rubber from sticking to the glass wall and to bring the blood intended for transfusion into contact with media that is as clean and smooth as possible, the rubber plunger is covered with the blind end of a fish bladder, such as those that are often commercially available, before use. It is sufficient to moisten this bubble in order to produce the lightest and slipperiest possible movement of the piston in the glass boot, and in this way the oiling of the piston is avoided.

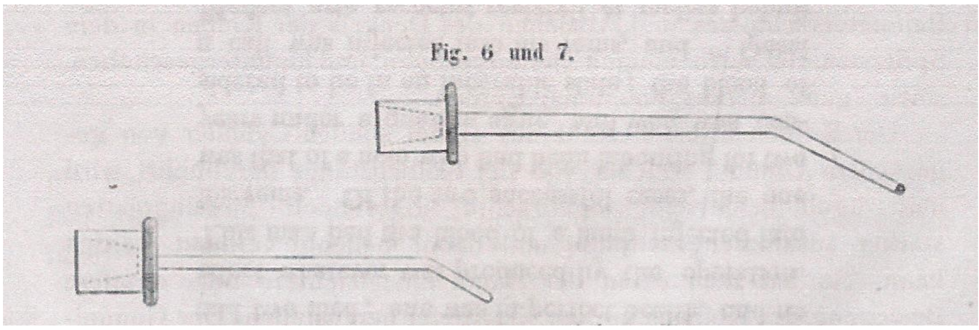
A short rubber tube (Fig. 5) is slipped over the olive-shaped button of the glass syringe, the free end of which receives the button of the so-called intermediate piece.



Rubber hose with adapter and sealing capsule.

To close the apparatus after it has been filled with defibrinated blood, a small silver closure capsule is used, which fits exactly onto the conically tapering half of the intermediate piece mentioned. This closure capsule corresponds to the thimble-shaped sleeve on the Gesellius transfusor.

Finally, the cannulas (Figs. 6 and 7) have also been given a different shape. I no longer had them end in a curve, but the lower end was simply bent over at an obtuse angle over a length of 1 to $1^1/_2$ centimetres. This lower short arm is pushed completely into the vein, the upper longer arm can then be easily held in place without the slightest strain on the vein.



Two silver cannulas of different sizes,

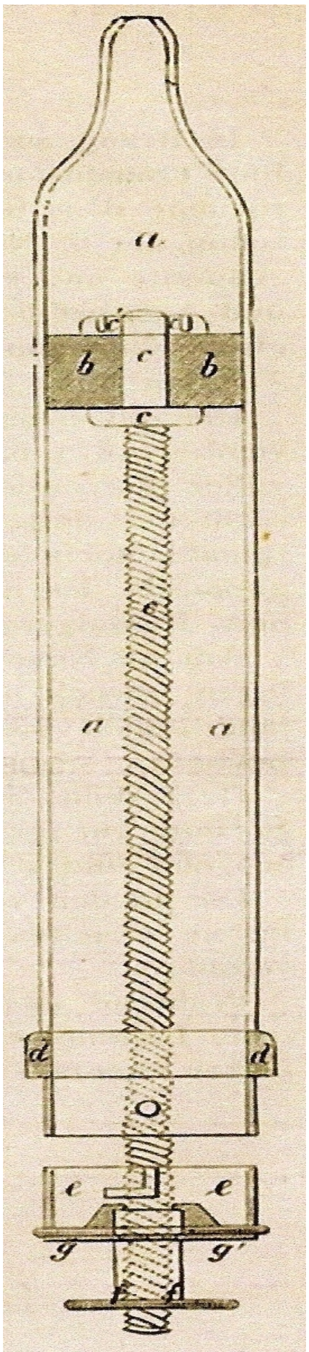
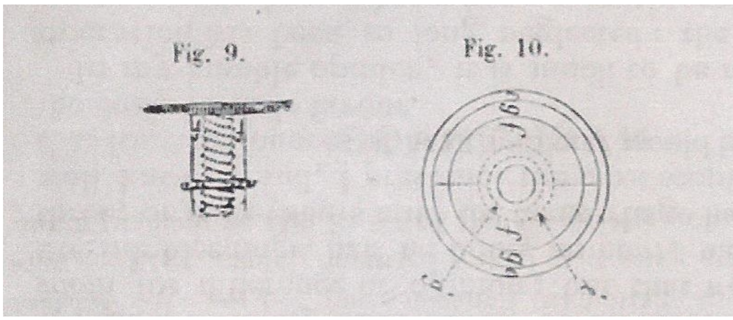


Fig. 8.



In the glass syringe *a* (Fig. 8.) the rubber piston *b* moves, which is pressed together between the disk of the piston rod *c* and the nut c' until it fits exactly into the glass tube. The piston rod *c* has a left-handed double thread along its entire length - 4 threads per 1 centimetre in length and is moved by rotation by the nut *f* (Fig. 8 and 9). The latter is attached to the capsule *e* by means of the halved disk *g* (Fig. 9 and 10) in such a way that the screwed-in nut *n* (Fig. 9) causes the guidance and rotation. The two half disks *g* and g' are screwed to the capsule with 2 screws each. The sleeve *d* is cemented onto the glass tube *a*. The capsule *e* fits exactly onto the base of this sleeve and is held in place by a double bayonet lock. (*)

The above apparatus is certainly quite useful and was applauded by all the colleagues to whom I presented it. It has the greatest similarity to Mosler's apparatus, which it is by no means modelled on, and over which it also has some advantages.

A few such cannulas, an intermediate piece with a short rubber tube and the closure capsule, and a condom of fish bladder can easily be stored in any first-aid bag, and this means that indirect transfusions can be carried out at any location in an emergency. Because a beer syringe can be found in every village tavern, the boot of which can be easily cleaned with hot water and ash; the piston is made sufficiently clean and well closed by slipping the fish bladder over it and the syringe prepared in this way is connected to the apparatus by means of the short rubber hose.

(*) The tip of the glass syringe is drawn too wide and the capsule too narrow.