SOME NOTES ON PARENTERAL THERAPY IN INFANTS

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In the treatment of infants we are frequently faced with the problem of a dehydrated child, unable to maintain its water balance because of fairly continuous vomiting and diarrhœa. This condition, if allowed to continue for even a few hours, may cause a very serious state known as 'acidosis' which if unrelieved may soon end in death. Water balance in the infant is a most important matter and must be maintained in the face of enormous fluid loss, both by vomiting and diarrhœa.

When fluids cannot be taken by mouth in sufficient quantities to maintain this balance, they must be given in other ways. Rectal drips are of very little use in infants, as they cannot co-operate properly and diarrhœa is a frequent symptom. So fluids have to be given by hypodermoclysis.

The solutions most frequently used are salt solutions of normal and five-per cent strengths, and glucose solutions of five- and ten-per cent strengths. The glucose is useful in neutralizing the acidosis and nourishing the body cells, while the saline is equally important in other ways. Often these solutions are combined.

Another fluid given in this way, that is of supreme importance, is blood. This may be transferred directly from the donor to the patient, or may be citrated to keep it from clotting and then injected later, even after a period of days if kept in a refrigerator.

Fluids are given parenterally in the following ways—

1. Subcutaneously—on the thighs, abdomen, and sides of the chest.
2. Intravenously—by dissecting out a vein (since the veins in infants are too small to be entered directly through the skin as in adults).
   Or by putting a needle directly into the longitudinal sinus through the anterior fontanelle.
3. Intra-peritoneally—by pressing a needle through the anterior abdominal wall. (Only saline can be given by this route.)

The subcutaneous method is the simplest, though not always the most effective. Ten cubic centimetres per pound of body weight may be given in this way as often as three times a day, though one has to be guided by the ability of the circulation to pick up the fluid. The solution is usually allowed to flow into the subcutaneous spaces by gravity from a graduated burette with rubber tube and needles attached. When the needles are withdrawn, if the solution has a tendency to escape from the puncture holes, these holes can be sealed by a small square of adhesive tape moistened with ether, which will enable it to stick even when wet. Saline, normal and five per cent, and glucose five per cent are given in this way.

The intravenous method is the most useful in severe cases, and will restore a failing pulse and blood-pressure very quickly where the subcutaneous or interstitial method is useless. A single injection of 15 ccs. per lb. of body weight may be given by syringe and needle or a continuous injection by the drip method (similar to a rectal drip) may be continued for several days if necessary. In either case, since infant's veins are very small, it is necessary to cut down under local anæsthesia, dissect out the vein, tie the needle or cannula into the vein, attach the syringe or the end of the tube from the drip apparatus, and thus inject the solution.

The only alternative to this, in common use, is to give single injections into the longitudinal sinus through the anterior fontanelle. Here, a needle with a very short bevel is used, and it is best to have a stop attachment

(a lead shot soldered on is the simplest) a few millimetres from the point (various sizes are necessary according to the size of the infant), to prevent a sudden plunge through the sinus into the brain. The needle is pressed firmly through the scalp and cartilage covering of the fontanelle, in the mid-line and towards the posterior angle of the fontanelle, and when blood appears freely in the syringe the solution is injected slowly, with frequent pauses to withdraw the piston slightly to see if the point is still in the sinus, shown by a free flow of blood back into the syringe. Such injections may be given daily for a week or two, if necessary, provided care is taken to use a sharp needle, and not to inject fluid outside the sinus in which case the fontanelle becomes boggy. When the needle is withdrawn, firm pressure is appplied to the fontanelle for five minutes.

Intra-peritoneal injection is useful when the other methods are not available or are contra-indicated for various reasons. A fairly blunt short-bevelled needle is passed through the skin of the abdomen, a little to one side of the umbilicus, carried subcutaneously and horizontally for about one inch (to provide a seal when the needle is withdrawn), and then the point of the needle is directed vertically down through the rectus muscle, while the infant cries so that the muscles are rigid, and the needle enters the peritoneal cavity with a distinct 'plop'. About 15 ccs. per lb. body weight of solution are injected and the needle withdrawn. Saline is used, as glucose is somewhat irritating and might cause an aseptic inflammation. Intra-peritoneal injections are contra-indicated if the abdomen is distended.

The giving of blood intravenously is often a life-saving procedure. The blood of the donor and patient are tested to secure proper matching, for, as there are four distinct kinds or 'types' of blood, and as these types are incompatible with each other, the donor and patient must belong to the same blood-group. The blood is taken from the veins at the front of the elbow of the donor's arm, by a needle pushed through the skin, and injected at once into the vein of the infant, after a needle has been tied in as in intravenous work. Or, if the child is an infectious case, or has a septicæmia, all the necessary blood is first withdrawn from the donor and citrated to prevent clotting. Then it is injected into the infant. By these precautions the donor is not exposed to the possibility of infection of his blood. This is not an imaginary danger if care is not taken, for donors have become infected in cases of septicæmia where direct transfusion has been used. Such citrated blood can be preserved in sterile flasks for a week or even more if kept in a refrigerator. Blood transfusions are sometimes repeated every second or third day in severe cases and each time a new vein has to be found. Blood cannot be given by the fontanelle, for it is necessary to observe the return flow of blood from the sinus frequently during injection, and blood flowing back into blood is not easily observed.

Mention should be made of one more method that is sometimes valuable. If the child is at an age when the veins are small, and one has not the time or the apparatus to dissect out a vein, and at the same time the fontanelle is completely closed with bone, an emergency intravenous may be given by putting a needle directly through the skin of the neck into the external jugular vein. In the infant, this is is the largest superficial vein, and it may be made to stand out distended by bending the head towards the opposite shoulder and making the infant cry. A sharp (specially sharp, because the skin in this region is very tough even in infants) short-bevel needle is then inserted and the solution injected toward the heart.

Parenteral therapy is perhaps the most important feature of the treatment of infants suffering from any disease causing a diarrhœa, or vomiting, or a severe toxæmia.