Surgery Saved the Day

By STEVEN M. SPENCER

The doctors call it hydrocephalus—"water on the brain"—and, in the past, it has killed ninety per cent of its tiny victims before they were two years old. Now a dramatic new surgical idea is making well children of a majority of such cases.

This small patient on the miniature operating table was, however, to have a much better chance at normal life and health than is indicated by the above statistics. For the two teams of surgeons, one working on the spine and the other on the abdomen, would carry out the two phases of a remarkable new procedure, designed to pipe off the excess spinal fluid and prevent the damaging rise in pressure within the skull and spinal canal.

The operation, developed in its present form by Dr. Eugene B. Spitz, neurosurgeon, and Dr. C. Everett Koop, chief surgeon, both of the Children's Hospital staff, is one of the most effective solutions yet offered for a problem that has challenged the best surgical efforts for more than fifty years. And it is part of a concentrated preventive attack which the Philadelphia Children's Hospital doctors and other teams, notably Dr. Frank D. Ingham and his associates in Boston, are making against certain anatomical causes of mental retardation.

These causes have long technical names. In addition to hydrocephalus, the main ones under consideration here are subdural hematomas and craniostenosis. They differ from one another in many details. But they have one thing in common. All of them are "brain crowders." They place a constricting barrier of fluid, membranes or bone, around or against the infant's brain. And as the brain at this age is growing with amazing rapidity—doubling in volume during the first nine months of life and attaining 90 per cent of full adult development by the end of the second year—it is obvious that any physical restraint upon such growth will have serious consequences, in some cases squeezing the brain into a layer of tissue only a fraction of an inch in thickness.

From this it follows that the restraining shackles must be cut away early in life if the brain is to have a chance to grow normally. Neurosurgeons for the affected infants have already been successful, therefore, in using an emergency procedure. An operation that will help a baby at three weeks or three months of age may be useless if put off until he is a year old or a year and a half old.
In Nancy's case the first signs of trouble had been feeding difficulties and a fever when she was only five days old. Her doctor at the Northern New Jersey hospital where she was born immediately began a search for the cause. First he found blood in the spinal fluid. Then he noticed the baby's head was beginning to enlarge, an observation he confirmed with a tape measure. Finally, when a needle puncture revealed intracranial pressure and a thinning of the brain, the doctor suspected hydrocephalus and sent Nancy to Philadelphia.

Following the operation, which involved inserting a plastic drainage tube between the spinal canal and the abdominal cavity, she began almost at once to improve. The "soft spot," or fontanel, where the bones of the forehead are joined, had previously been taut and bulging. As soon as drainage was established it flattened out. The head lost its swollen appearance and slowed down to a normal rate of growth, so that over a period of months the rest of Nancy's body was able to catch up with it and eliminate any disproportion in size. She began to eat normally, and to laugh and smile like any well and happy baby. Her mental development, by all tests, is proceeding at a good pace, showing that the operation was done in time to prevent any serious brain damage.

The urgent necessity for prompt action is a point which all physicians working on this problem feel has not been fully understood or strongly enough emphasized. Errors of two types have been made, both resulting in tragic loss of precious time. Some parents, although recognizing an abnormality, have done nothing about it because they have been advised the situation was hopeless and nothing could be done. Others have been told that the odd shape of the baby's head or some slowness in sitting up, walking or talking was "nothing to worry about" and that the child would "grow out of it."

It is a doctor's business to worry about these things, asserts Doctor Spitz; it takes only a few minutes for a physician to determine, by feeling the bones of a baby's head, whether there is really anything to worry about and whether a more detailed and extensive examination is called for. It is also a mistake to assume that convulsions or other neurological disturbances are simply due to psychological factors or to a fever. Convulsions aren't normal, whether the child has a fever or not, and they should always be investigated to determine the underlying cause.

Appreciation of the need for earlier recognition and treatment of neurological conditions in children is what prompted the heads of several departments at the University of Pennsylvania School of Medicine—Dr. I. S. Ravdin, of surgery; Dr. Francis C. Grant, of neurosurgery;
They took the baby to the surgeons there, who performed the operation when she was eight weeks old. Betty's improvement since then has been remarkable. She was eight months old and was able to stand on her feet when given support. Although her head is slightly wider and more rounded than the normal, it is every indication that she will develop properly in every other respect.

Sometimes it is not easy to diagnose the condition at an early stage, but there may be other difficulties that cause the doctors to keep an eye on the baby. In the case of Billy M., who was born early in 1951, after a long and difficult labor, and who had so much trouble breathing at birth, we were hopeful. He was given oxygen and fluid. On the second day he was transferred to the Children's Hospital, where doctors found that in addition to his respiratory troubles there was slight spasticity in his arms and legs. And there were certain abnormal reflexes. However, he improved in a few days and was discharged with a request that the family doctor keep a close watch on him and bring him back to the hospital in three months, or sooner if his condition changed.

It was soon noticed that Billy's head was becoming larger than normal. His parents observed that caps and bonnets didn't fit him.

"But you know how babies' heads often are," she said. "Lots of babies have large heads at first. I didn't think too much about it." Her doctor did, however. He also noticed that Billy's upper eyelids were drooping and that he had a small amount of hydrocephalus. He lost no time in getting Billy back to Children's Hospital. In the diagnosis was made, and the situation and the operative procedure carefully explained to the parents. They were told that with adequate care the life of this little fellow, with black hair and bright eyes, would be normal. Later that night, they were sitting in the small gallery as the baby was taken to the abdominal cavity in fifteen minutes. The operation was performed in the abdominal cavity, where it would be absorbed into the general circulation of the blood and lymph. They used a plastic tubing, and a plastic tube was inserted into the abdominal cavity, and the other end was placed in the baby's foot. Betty's parents have always been encouraged by the progress of the baby. They have been told that the baby's condition will improve as she grows older.

"We tried and tried to get information about what was going on and what was going to happen," the mother related, "but we could never get hold of the doctor. I guess he just didn't give us the bad news. Finally, after months of waiting, we got the baby and the baby's father added. "He always says it that way—"eek" for the bird. He had a real problem with the baby's head, and he wanted to do something for it."

"He was very alert, had a good appetite. In the hospital, where it would be absorbed into the general circulation of the blood and lymph. The baby was placed in charge, and Doctor Koop, chief surgeon at the hospital and associate professor of pediatric surgery, was closely in touch with the parents. There is every indication that the baby will develop properly in every other respect.

Sometimes it is not easy to diagnose the condition at an early stage, but there may be other difficulties that cause the doctors to keep an eye on the baby. In the case of Billy M., who was born early in 1951, after a long and difficult labor, and who had so much trouble breathing at birth, we were hopeful. He was given oxygen and fluid. On the second day he was transferred to the Children's Hospital, where doctors found that in addition to his respiratory troubles there was slight spasticity in his arms and legs. And there were certain abnormal reflexes. However, he improved in a few days and was discharged with a request that the family doctor keep a close watch on him and bring him back to the hospital in three months, or sooner if his condition changed.

It was soon noticed that Billy's head was becoming larger than normal. His parents observed that caps and bonnets didn't fit him.

"But you know how babies' heads often are," she said. "Lots of babies have large heads at first. I didn't think too much about it." Her doctor did, however. He also noticed that Billy's upper eyelids were drooping and that he had a small amount of hydrocephalus. He lost no time in getting Billy back to Children's Hospital. In the diagnosis was made, and the situation and the operative procedure carefully explained to the parents. They were told that with adequate care the life of this little fellow, with black hair and bright eyes, would be normal. Later that night, they were sitting in the small gallery as the baby was taken to the abdominal cavity in fifteen minutes. The operation was performed in the abdominal cavity, where it would be absorbed into the general circulation of the blood and lymph. They used a plastic tubing, and a plastic tube was inserted into the abdominal cavity, where it would be absorbed into the general circulation of the blood and lymph. The baby was placed in charge, and Doctor Koop, chief surgeon at the hospital and associate professor of pediatric surgery, was closely in touch with the parents. There is every indication that the baby will develop properly in every other respect.

Sometimes it is not easy to diagnose the condition at an early stage, but there may be other difficulties that cause the doctors to keep an eye on the baby. In the case of Billy M., who was born early in 1951, after a long and difficult labor, and who had so much trouble breathing at birth, we were hopeful. He was given oxygen and fluid. On the second day he was transferred to the Children's Hospital, where doctors found that in addition to his respiratory troubles there was slight spasticity in his arms and legs. And there were certain abnormal reflexes. However, he improved in a few days and was discharged with a request that the family doctor keep a close watch on him and bring him back to the hospital in three months, or sooner if his condition changed.

It was soon noticed that Billy's head was becoming larger than normal. His parents observed that caps and bonnets didn't fit him.

"But you know how babies' heads often are," she said. "Lots of babies have large heads at first. I didn't think too much about it." Her doctor did, however. He also noticed that Billy's upper eyelids were drooping and that he had a small amount of hydrocephalus. He lost no time in getting Billy back to Children's Hospital. In the diagnosis was made, and the situation and the operative procedure carefully explained to the parents. They were told that with adequate care the life of this little fellow, with black hair and bright eyes, would be normal. Later that night, they were sitting in the small gallery as the baby was taken to the abdominal cavity in fifteen minutes. The operation was performed in the abdominal cavity, where it would be absorbed into the general circulation of the blood and lymph. They used a plastic tubing, and a plastic tube was inserted into the abdominal cavity, where it would be absorbed into the general circulation of the blood and lymph. The baby was placed in charge, and Doctor Koop, chief surgeon at the hospital and associate professor of pediatric surgery, was closely in touch with the parents. There is every indication that the baby will develop properly in every other respect.

Sometimes it is not easy to diagnose the condition at an early stage, but there may be other difficulties that cause the doctors to keep an eye on the baby. In the case of Billy M., who was born early in 1951, after a long and difficult labor, and who had so much trouble breathing at birth, we were hopeful. He was given oxygen and fluid. On the second day he was transferred to the Children's Hospital, where doctors found that in addition to his respiratory troubles there was slight spasticity in his arms and legs. And there were certain abnormal reflexes. However, he improved in a few days and was discharged with a request that the family doctor keep a close watch on him and bring him back to the hospital in three months, or sooner if his condition changed.

It was soon noticed that Billy's head was becoming larger than normal. His parents observed that caps and bonnets didn't fit him.

"But you know how babies' heads often are," she said. "Lots of babies have large heads at first. I didn't think too much about it." Her doctor did, however. He also noticed that Billy's upper eyelids were drooping and that he had a small amount of hydrocephalus. He lost no time in getting Billy back to Children's Hospital. In the diagnosis was made, and the situation and the operative procedure carefully explained to the parents. They were told that with adequate care the life of this little fellow, with black hair and bright eyes, would be normal. Later that night, they were sitting in the small gallery as the baby was taken to the abdominal cavity in fifteen minutes. The operation was performed in the abdominal cavity, where it would be absorbed into the general circulation of the blood and lymph. They used a plastic tubing, and a plastic tube was inserted into the abdominal cavity, where it would be absorbed into the general circulation of the blood and lymph. The baby was placed in charge, and Doctor Koop, chief surgeon at the hospital and associate professor of pediatric surgery, was closely in touch with the parents. There is every indication that the baby will develop properly in every other respect.

Sometimes it is not easy to diagnose the condition at an early stage, but there may be other difficulties that cause the doctors to keep an eye on the baby. In the case of Billy M., who was born early in 1951, after a long and difficult labor, and who had so much trouble breathing at birth, we were hopeful. He was given oxygen and fluid. On the second day he was transferred to the Children's Hospital, where doctors found that in addition to his respiratory troubles there was slight spasticity in his arms and legs. And there were certain abnormal reflexes. However, he improved in a few days and was discharged with a request that the family doctor keep a close watch on him and bring him back to the hospital in three months, or sooner if his condition changed.

It was soon noticed that Billy's head was becoming larger than normal. His parents observed that caps and bonnets didn't fit him.

"But you know how babies' heads often are," she said. "Lots of babies have large heads at first. I didn't think too much about it." Her doctor did, however. He also noticed that Billy's upper eyelids were drooping and that he had a small amount of hydrocephalus. He lost no time in getting Billy back to Children's Hospital. In the diagnosis was made, and the situation and the operative procedure carefully explained to the parents. They were told that with adequate care the life of this little fellow, with black hair and bright eyes, would be normal. Later that night, they were sitting in the small gallery as the baby was taken to the abdominal cavity in fifteen minutes. The operation was performed in the abdominal cavity, where it would be absorbed into the general circulation of the blood and lymph. They used a plastic tubing, and a plastic tube was inserted into the abdominal cavity, where it would be absorbed into the general circulation of the blood and lymph. The baby was placed in charge, and Doctor Koop, chief surgeon at the hospital and associate professor of pediatric surgery, was closely in touch with the parents. There is every indication that the baby will develop properly in every other respect.
side, as we have said, to permit both surgeons to operate simul-
taneously. A surgical assistant now swabs the back and belly with bright orange antiseptic solution. As the nurses begin to drape sheets over the baby, Doctor Koop, helping in this procedure, feels the fabric between hands and back, and says, "This one is too hot and heavy," he says, throwing it aside; and to the visitor in the operating-room gallery, "You don't realize how much these things weigh on a little body."

A flat plate in the shape of a pancake turns under the knife, and the surgeon carefully strips the omentum from the stomach, "You don't realize how much these things to leak blood into the peritoneal cavity."

"When a child takes anesthesia poorly," Doctor Spitz explains, "it is often a sign that some brain damage has already occurred."

Doctor Koop has already connected one end of an instrument, sometimes called a "tower skull," with a bone nicker he removes parts of two rows of teeth, for he screamed almost all day, and the lethargy was in turn due to his crying."

"Sometimes as many as twenty babies with congenital communicating hydrocephalus. "The brain, striving to grow at a faster locomotion, as many babies do in the fourth month, in September, 1952."

The brain, which is the center of the brain, is the center of the brain, and the lethargy was in turn due to this crying."

"The brain, which is the center of the brain, has already caused such serious brain damage that surgery could not have helped and has been abandoned," Doctor Koop says.

"Thirty-eight years at Children's Hospital forty-five years, however, have neurosurgeons point out, "They can go from good to bad to good to bad again."

Craniostenosis was recognized in an unusual aspect of his case was that even though the skull bones had fused together prematurely, they had not been expected to improve mental development. Failure to distinguish between normal and true craniostenosis, which could have been helpful, thus led to the temporary abandonment of the operation.

"The baby's skull," Doctor Spitz remarks, "is a healthy pink again. Doctor Deming made some remarks about the shoulders and the spine with his fingers and marked with purple dye the site of the proposed incision, makes a two-inch cut. This exposes the ridge of the spine, and with a bone nicker he removes parts of two rows of teeth."

"The condition was found to be a hematoma, and two operations were performed during the baby's fourth hospitalization, when he was only two years old. An unusual aspect of his case was that even though the skull bones had fused together prematurely, they had not been expected to improve mental development. Failure to distinguish between normal and true craniostenosis, which could have been helpful, thus led to the temporary abandonment of the operation."

"But, as the physicians point out, "They can go from good to bad to good to bad again.""