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# Research In A Community Hospital

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The physician who is actively practicing clinical medicine in the community hospital of today, is for the most part under great stress to conscientiously carry out the craft and art of his profession, to keep abreast of rapidly expanding medical knowledge and to participate in an educational program so necessary to the progress of his hospital. The opportunity for basic research is very limited and in almost all instances one must rely on the full time research scientist to initiate preliminary investigation, especially that of a scientific nature.

Nevertheless, the clinician has many opportunities to expand on and apply research principles, techniques and laboratory procedures. In most community hospitals facilities are available for investigation and the guidance and advice of directors of laboratories is most easily obtained. Hospital administrators, almost without exception, are anxious to support and encourage any program of study that will contribute to the improvement in medical care offered the citizens of their community.

A very definite opportunity to expand on basic research was noted in 1961, by the members of the Department of OB-Gyn of Providence Hospital, Southfield, Michigan, a general community hospital of 400 beds. New laboratory studies, as related to the Rh negative iso-immu-

nized mother began to appear in the medical literature and seemed to offer a more direct, yet practical, method of evaluating the hemolytic process in the unborn fetus. We felt that the members of our department and of the hospital laboratories were fully capable of undertaking a programmed study in this field that very well might have great clinical application in the evaluation of our Rh negative sensitized patients.

To the clinical obstetrician, the care and treatment of the pregnant Rh negative immunized mother, has for years been a perplexing problem. The studies of such immunologists as Levine and Wiener, had explained the process of Rh sensitization in the mother with resultant antibody production and fetal hemolysis of varying degree. In an effort to save these babies, early termination of pregnancy and blood exchange of the newborn was necessary. However, prematurity often resulted in fetal loss. On the other hand, delayed interruption of the pregnancy produced infants suffering with severe anemia, heart failure and advanced stages of erythroblastosis fetalis that could not be corrected by the best pediatric care. The obstetrician, guided in his judgment by such indirect methods as blood titre studies, past history and clinical evaluation of the status of the pregnancy, was at a great disadvantage in determining the optimum time for delivery. There was no set standard and as a result the infant mortality rate associated with

erythroblastosis fetalis remained unimproved.

A breakthrough occurred in this problem with the work and publication of Liley<sup>1</sup>, in New Zealand. Obtaining amniotic fluid from the pregnant, Rh sensitized mother, by a technique of abdominal amniocentesis, he was able to show that when this specimen of fluid was subjected to spectrophotometric analysis, a particular absorption curve could be demonstrated that represented bilirubin products present in the fluid. By plotting optical density against wave length, Dr. Liley, could plot a graph that gave a rough measure of these bilirubin products and from this an evaluation of the severity of the hemolytic process in the unborn fetus could be made. For the first time an essentially simple technique and laboratory test was described that could have great clinical application in the field of obstetrics.

Following the publication of this paper and under the stimulus of Harold Henderson, M.D., then Chief of the Department of Obstetrics and Gynecology at Providence Hospital, active staff and resident participation was obtained, correspondence was started with Dr. Liley, and under his guidance the technique of abdominal amniocentesis was started in some of our Rh negative pregnant mothers, with elevated anti Rh titres. The analysis of the amniotic fluid specimen was carried out with the assistance of Ruth McNair, Ph.D., Director of our Department of Biochemistry, and the cost of the initial program was absorbed by the hospital administration.

<sup>1</sup>Am. J. Obst & Gynec, 82:1359, 1961.

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As the program progressed and as we gained in confidence and experience, the Liley approach to the problem of the Rh sensitized mother became a routine in all indicated patients. The plan now followed at Providence Hospital is to perform the abdominal amniocentesis on an outpatient basis in our Rh Negative Clinic. The patient is given an appointment as instructed by the attending physician, all sterile precautions are observed and the abdominal tap is performed under local anesthesia. The first specimen may be taken as early as 24 to 26 weeks of gestation as indicated by past history and serum titre studies and is usually repeated at two week intervals. To date this procedure has been entirely safe and no untoward reactions or significant infections have occurred. The cost to the patient is minimal.

The spectrophotometric analysis of the amniotic fluid specimen is performed in our department of biochemistry as soon as possible following the tap and usually the attending physician has received a report and graph analysis within 24 - 48 hours. The graph analysis in our clinic, has been arranged into 5 "zones" ranging from very low (unaffected infants) to very high (severe fetal hemolysis) and this graph together with the patients past history, serum titre studies, and clinical evaluation, are reviewed by a standing Rh negative committee for recommendations and treatment and followup studies.

To date more than 350 amniocentesis and amniotic fluid analysis have been carried out in our clinic.

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In 1965 out of a total of 2377 obstetrical deliveries at Providence Hospital, the test was performed in 68 indicated patients. We now feel well versed and experienced with this procedure and it is now a standard part of the obstetrical care offered our patients.

It is remarkable how accurate this test has been in assisting the obstetrician in his evaluation of the severity of the hemolytic process in the unborn fetus, as well as in ruling out the unaffected infant. The procedure has proven to have great practical value and has enabled us to work more accurately with the pediatricians and we feel that final studies will reveal a significant decrease in our fetal mortality from erythroblastosis fetalis.

As a further extension of his work, Liley<sup>2</sup> attacked the problem of the severely affected unborn fetus, where intrauterine death was inevitable, and because of severe prematurity, termination of pregnancy was contraindicated. He developed a technique of transabdominal, intrauterine fetal injections of small amounts of fresh blood cells. Admittedly a heroic procedure, it nevertheless enabled the fetus to receive fresh blood that would correct temporarily, the severe fetal anemia until the optimum time for delivery could be reached. Dr. Liley, has been successful with this procedure and has a number of living children saved from an otherwise impossible situation.

<sup>2</sup> *Brit. Med. J.* 2:1107, 1963.

Again, under Dr. Liley's guidance we attempted and carried out transabdominal, intrauterine fetal injections of fresh blood, in some of our severely affected patients and we believe that our staff conducted one of the first such procedures in the United States. The first attempts, although technically successful, did not result in living infants, but in late 1963, we were able to successfully carry out transabdominal intrauterine transfusion and later to deliver a normal child that is now living and well. All indications pointed out that this baby was otherwise doomed to intrauterine death from hemolysis and anemia.

Our overall experience, especially with amniotic fluid analysis and its clinical application, has been a most rewarding one. By recognizing the clinical possibilities of Doctor Liley's basic research work, and by making use of existing facilities we feel that our community hospital has made a substantial contribution to progress in the field of the Rh negative iso-immunized patient.

The experience and confidence that we have gained in our development of this procedure has enabled us to offer our patients an improvement in the quality of obstetrical care that is equal to that of any clinic in this country. With the ever expanding and increasing role of the community hospital in present day medicine, it is our duty and obligation to constantly strive to provide the best quality of medical care offered the citizens of our community.