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[56] **References Cited**
UNITED STATES PATENTS
 905,983 12/1908 Brown..... 256/33

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[54] **ABDOMINAL GRID FOR INTRAUTERINE FETAL TRANSFUSION**
7 Claims, 2 Drawing Figs.

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 250/67

[51] **Int. Cl.**..... **A61m 5/00,**
G01n 21/34

ABSTRACT: An abdominal grid for intrauterine fetal peritoneal transfusions.

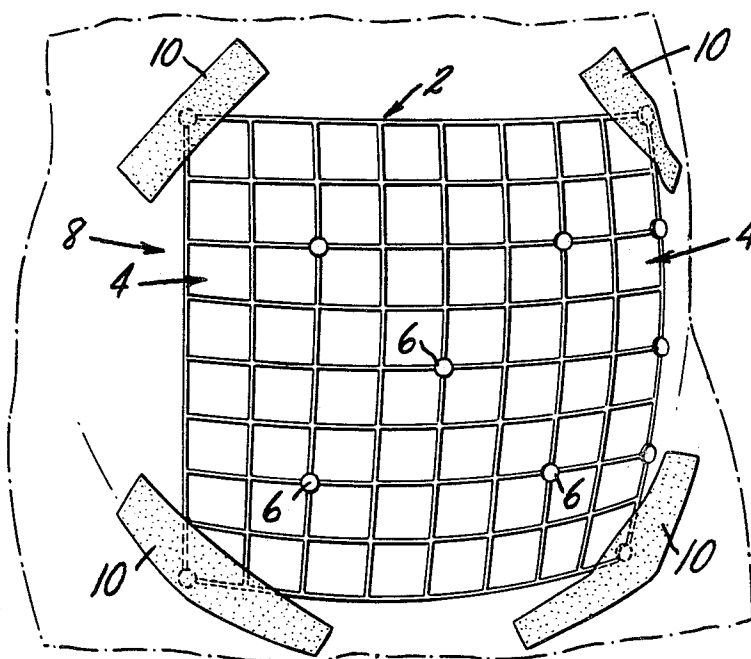


FIG. 1

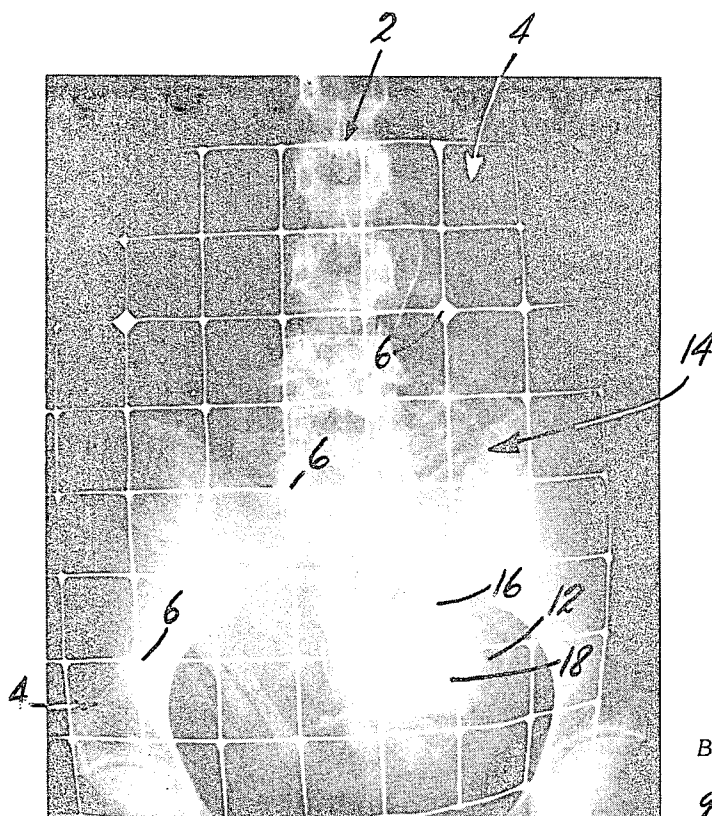
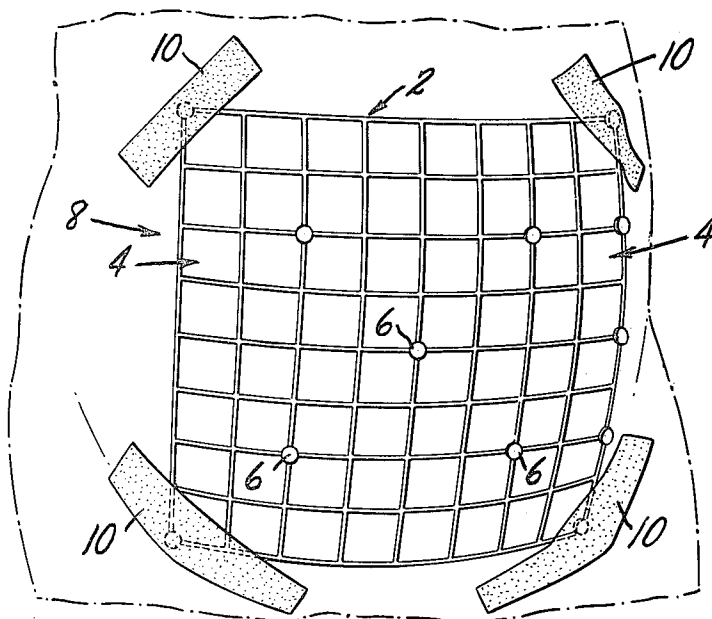


FIG. 2

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ABDOMINAL GRID FOR INTRAUTERINE FETAL TRANSFUSION

The present invention relates to intrauterine fetal transfusions and, more particularly, to an abdominal grid designed to aid in the localization of the fetus in the peritoneal cavity.

The severity of fetal erythroblastosis can be assessed from the results of analysis of amniotic fluid specimens. In those pregnancies in which the fetus is at serious risk of imminent death from hemolytic disease but is too premature to be delivered (prior to 33—34 weeks of gestation), the method of intrauterine fetal transfusions by transabdominal injection of packed red cells has now been established as the treatment of choice.

Since it is not feasible to perform the transfusion under a fluoroscope which would enable the doctor to observe instantaneously the insertion of a needle or catheter into the fetal abdomen, the problem for the doctor has been location of a reference point so that he is reasonably certain of the insertion of the catheter or needle at the proper place.

The prior technique developed to perform intrauterine transfusions involved the taping of ball bearings or other metallic markers to the mother's abdomen. Lateral and antero-posterior X-rays were then taken to determine the position of the fetus and its relation to the reference point, ball bearing markers. The necessity of taping metallic markers to the mother's abdomen in itself rendered a complete sterile procedure impossible.

Accordingly, it is an object of the present invention to provide a new device to facilitate intrauterine fetal peritoneal transfusions which is both simpler and more easily sterilized than the apparatus of prior techniques.

Another object of the present invention is to provide the device with reference points to aid the doctor in selecting the proper point for injection.

These and other objects are accomplished, in accordance with the present invention, by an abdominal grid which includes a plurality of X-ray opaque, flexible, intersecting horizontal and vertical wires or rods which are secured to each other at the points of intersection.

In use, a dye is first injected into the amniotic fluid which the fetus drinks and which subsequently finds its way into the bowels of the fetus. A grid in accordance with the present invention is then placed on the mother's abdomen and fastened at four corners by tape. An initial flat plate and lateral X-ray photographs are taken. The X-ray photographs are then developed and the transfusion procedure is ready to be performed. The dye concentrated in the fetal bowels can be readily ascertained through the grid and the placement of the needle can be performed with ease and accuracy. The grid made of stainless steel is easily sterilized and may remain in place during the subsequent transfusion or be removed prior to the administration of red cells after placement of the catheter has been performed.

For a better understanding of the present invention, reference may be had to the accompanying drawings in which:

FIG. 1 illustrates a grid in accordance with the present invention in place on a place on a mother's abdomen; and

FIG. 2 is a photograph showing the grid in place as visualized in a radiograph.

As shown in FIG. 1, the instrument designed to aid in the localization of the fetal peritoneal cavity consists of a flexible stainless steel grid 2, 8 by 8 inches square, and subdivided into 1 by 1 inch squares 4. At points of intersection on the grid, enlarged portions or markers 6 are placed at specific locations for reference points to help localize the proper square for injection. The grid 2 is placed on the mother's abdomen 8 and is fastened at the four corners by tape 10. The grid is flexible and is placed to follow the contour of the maternal abdominal wall. The 1 by 1 inch squares allow easy manipulation within the squares for the subsequent intrauterine transfusion.

As shown in FIG. 2, the fetal bowel 12 has been opacified by

the previous injection of an opacifying agent 16 into the amniotic fluid followed by the subsequent swallowing by the fetus 14 and concentration of the opacifying agent 16 in the fetal small bowel 12. An initial flat plate and lateral X-ray examinations are taken and then developed. The dye 18 concentrated in the fetal small bowel 12 and its position in relation to the grid 2 can be readily ascertained in the X-ray photographs and the doctor can easily and accurately insert a needle 16 through the mother's abdomen near the navel, positioning it in the fetal peritoneum. An injection catheter is then inserted through the needle 16. The injection of concentrated cells is then performed.

It will be apparent to those skilled in the art that modifications could be made to the present invention without departing from its spirit and scope. For example, the grid could be made of any suitable material such as other metals, or plastics or ceramics containing X-ray opaque material. Therefore, the invention is not deemed to be limited except as defined in the appended claims.

I claim:

1. An abdominal grid formed of a plurality of flexible intersecting horizontal and vertical wires or rods which are secured to each other at the points of intersection, the said wires or rods being opaque to X-rays and capable of being sterilized, said wires or rods having X-ray opaque elements mounted thereon at a minority of said intersections and arranged in a distinctive pattern to provide identifying loci for insertion by the doctor of a needle through the mother's abdomen and into the fetus.

2. An abdominal grid as defined in claim 1 wherein said intersecting horizontal and vertical wires or rods subdivide said grid into approximately one by one inch squares.

3. An abdominal grid as defined in claim 1 wherein said intersecting horizontal and vertical wires or rods are formed of stainless steel.

4. A method of performing intrauterine fetal transfusions comprising:

- Opacifying at least a portion of the fetus by the injection of an opacifying agent into the amniotic fluid;
- Placing on the mother's abdomen an abdominal grid as defined in claim 1;
- Taking and developing X-rays of the mother's abdomen;
- Locating on the X-rays the opacifying agent concentrated in the fetus and determining the agent's position in relation to the grid;
- Penetrating the abdomen of the mother and the abdominal wall of the fetus with an injection needle; and
- Injecting a fluid through the injection needle into the fetus.

5. The method claim 4 wherein said fluid is injected into the fetal peritoneal cavity.

6. The method of claim 5 wherein said injection needle is inserted into the abdominal cavity of the mother and positioned in the fetal peritoneal cavity, and including the step of passing a catheter into said fetal peritoneal cavity via said injection needle.

7. A method of locating a reference point for the insertion of a needle into a fetus comprising:

- Opacifying at least a portion of the fetus by the injection of an opacifying agent into the amniotic fluid;
- Placing on the mother's abdomen an X-ray opaque grid formed of a plurality of intersecting horizontal and vertical rods or wires which are secured to each other at the points of intersection and having an enlarged portion placed on at least one of said points of intersection for reference purposes;
- Taking and developing X-rays of the mother's abdomen; and
- Locating on said X-rays said opacifying agent concentrated in said fetus and determining the agent's position in relation to said grid.