DEPARTMENT OF HEALTH & HUMAN SERVICES — Public Health Service

Memorandum

Date · FEB 14 1997

From Director, Office of Device Evaluation (HFZ-400)
Center for Devices and Radiological Health (CDRH)

Subject Humanitarian Device Exemption Approval of COOK OB/GYN® Harrison Fetal Bladder Stent (Lowery Modification) - ACTION

To Director, CDRH
Regulations Policy and Management Staff, Office of Policy (HF-26) _____

ISSUE. Publication of a notice announcing approval of the subject Humanitarian Device Exemption (HDE).

FACTS. Tab A contains a FEDERAL REGISTER notice announcing:

(1) an HDE approval order for the above referenced medical device (Tab B); and

(2) the availability of the summary of safety and probable benefit for the device (Tab C).

RECOMMENDATION. I recommend that the notice be signed and published.

Philip J. Phillips
for Susan Alpert, Ph.D., M.D.

Attachments
Tab A - Notice
Tab B - Order
Tab C - Summary of Safety and Probable Benefit (SSPB)

DECISION

Approved ✓ Disapproved _____ Date 2/14/97

Prepared by Donna-Bea Tillman, Ph.D., CDRH, HFZ-470, 2/7/97, 594-1180

DEPARTMENT OF HEALTH AND HUMAN SERVICES

DRAFT

FOOD AND DRUG ADMINISTRATION

[DOCKET NO. _____]

COOK OB/GYN®; Humanitarian Device Exemption Approval of Harrison Fetal Bladder Stent (Lowery Modification)

AGENCY: Food and Drug Administration, HHS.

ACTION: Notice.

SUMMARY: The Food and Drug Administration (FDA) is announcing its approval of the humanitarian device exemption application by COOK OB/GYN®, Spencer, IN 47460, under section 520(m) of the Federal Food, Drug, and Cosmetic Act (the act) (21 U.S.C. 360j(m)), for the Harrison Fetal Bladder Stent (Lowery Modification).

DATES: Petitions for administrative review should be submitted by (insert date 30 days after date of publication in the Federal Register).

ADDRESSES: Written requests for copies of the summary of safety and probable benefit and petitions for administrative review should be submitted to the Dockets Management Branch (HFA-305), Food and Drug Administration, 12420 Parklawn Dr., rm. 1-23, Rockville, MD 20857.

FOR FURTHER INFORMATION CONTACT:

Donna-Bea Tillman,

Center for Devices and Radiological Health (HFZ-470),

Food and Drug Administration,

9200 Corporate Blvd.,

Rockville, Maryland 20850,

301-594-1180.

SUPPLEMENTARY INFORMATION: On November 13, 1996, COOK OB/GYN®, Spencer, IN 47460, submitted an application for a humanitarian device exemption (HDE) for the Harrison Fetal Bladder Stent (Lowery Modification) to CDRH. The device is a fetal bladder stent and is indicated for fetal urinary tract decompression following the diagnosis of fetal post-vesicular obstructive uropathy in fetuses 18 to 32 weeks gestational age.

In accordance with 21 CFR 814.116(a), this HDE was not referred to the Obstetrics and Gynecology Devices Panel, an FDA advisory committee, for review and recommendation because the information in the HDE substantially duplicates information previously reviewed by this panel.

On February 14, 1997, CDRH approved the application by a letter to the applicant from the Director of the Office of Device Evaluation, CDRH.

A summary of the safety and probable benefit upon which CDRH based its approval is on file in the Dockets Management Branch (address above) and is available from that office upon written request. Requests should be identified with the name of the device and the docket number found in brackets in the heading of this document.

Opportunity for Administrative Review

Section 515(d)(3) of the act (21 U.S.C. 360e(d)(3)) authorizes any interested person to petition, under section 515(g) of the act (21 U.S.C. 360e(g)), for administrative review of CDRH's decision to approve this application. A petitioner may request either a formal hearing under part 12 (21 CFR part 12) of FDA's administrative practices and procedures regulations or a review of the application and CDRH's action by an independent advisory committee of experts under Part 14 (21 CFR part 14). A petition is to be in the form of a petition for reconsideration under § 10.33(b) (21 CFR 10.33(b)). A petitioner shall identify the form of review requested (hearing or independent

advisory committee) and shall submit with the petition supporting data and information showing that there is a genuine and substantial issue of material fact for resolution through administrative review. After reviewing the petition, FDA will decide whether to grant or deny the petition and will publish a notice of its decision in the FEDERAL REGISTER. If FDA grants the petition, the notice will state the issue(s) to be reviewed, the form of the review to be used, the persons who may participate in the review, the time and place where the review will occur, and other details.

Petitioners may, at any time on or before (insert date 30 days after date of publication in the FEDERAL REGISTER), file with the Dockets Management Branch (address above) two copies each of the petition and supporting data and information, identified with the name of the device and the docket number found in brackets in the heading of this document. Received petitions may be seen in the office above between 9 a.m. and 4 p.m., Monday through Friday.

This notice is issued under section 520(h) of the act (21 U.S.C. 360j(h))), 21 CFR 814.116(b), and under authority delegated to the Commissioner of Food and Drugs (21 CFR 5.10) and redelegated to the Director, Center for Devices and Radiological Health (21 CFR 5.53).

Dated:_____

_____

DEPARTMENT OF HEALTH & HUMAN SERVICES

Public Health Service

Food and Drug Administration
9200 Corporate Boulevard
Rockville MD 20856

FEB 14 1997

Mr. Rick Lykins
Regulatory Affairs Technical Writer
COOK OB/GYN®
1100 West Morgan Street
P.O. Box 271
Spencer, Indiana 47460

Re: H960001
Harrison Fetal Bladder Stent Set (Lowery Modification)
Filed: November 13, 1996
Amended: November 27, 1996; January 24 and February 4, 1997

Dear Mr. Lykins:

The Center for Devices and Radiological Health (CDRH) of the Food and Drug Administration (FDA) has completed its review of your humanitarian device exemption (HDE) application for the Harrison Fetal Bladder Stent (Lowery Modification). This device is indicated for fetal urinary tract decompression following the diagnosis of fetal post-vesicular obstructive uropathy in fetuses of 18 to 32 weeks gestational age. CDRH is pleased to inform you that your HDE is approved subject to the enclosed "Conditions of Approval." Please note, however, that as stipulated in section 520(m)(5) of the Federal Food, Drug and Cosmetic Act (the act) (21 U.S.C. 360j(m)(5)), this approval is only valid for a period of 18 months from the date of this approval order. An extension of approval may be requested in accordance with the procedures outlined in the "Conditions of Approval". You may begin commercial distribution of the device after you have submitted an amendment to this HDE with copies of the approved labeling in final printed form.

The sale, distribution, and use of this device are limited to prescription use in accordance with 21 CFR 801.109 within the meaning of section 520(e) of the act (21 U.S.C. 360j(e)) under the authority of section 515(d)(1)(B)(ii) of the act (21 U.S.C. 360e(d)(1)(B)(ii)). In addition, in order to ensure the safe use of the device, FDA has further restricted the device within the meaning of section 520(e) of the act under the authority of section 515(d)(1)(B)(ii) insofar as (1) the labeling shall specify the training requirements for practitioners who may use the device as approved in this order and (2) the sale, distribution, and use must not violate sections 502(q) and (r) of the act (21 U.S.C. 352(q) and (r)).

In addition to the above, an FDA inspection must find that your manufacturing facilities, methods, and controls for this device comply with the applicable device Good Manufacturing Practice (GMP) Regulations (21 CFR Part 820). Such an inspection will be scheduled and conducted by your District Office. If you have any questions regarding the status of your GMP inspection, please contact your District Office or the Office of Compliance, CDRH at (301) 594-4695.

FDA wishes to remind you that failure to comply with the conditions of approval invalidates this approval order. Commercial distribution of a device that is not in compliance with these conditions is a violation of the act.

CDRH will publish in the **Federal Register** a notice of its decision to approve your HDE. The notice will state that a summary of the safety and probable benefit of the device upon which the approval was based is available to the public upon request. Within 30 days of publication of the notice of approval in the **Federal Register**, any interested person may seek review of this decision by requesting an opportunity for administrative review, either through a hearing or review by an independent advisory committee, under section 515(g) of the act (21 U.S.C. 360e(g)).

Any information to be submitted to FDA regarding this HDE should be submitted in triplicate, unless otherwise specified, to the address below and should reference the above HDE number to facilitate processing:

Document Mail Center (HFZ-401)
Office of Device Evaluation
Center for Devices and Radiological Health
Food and Drug Administration
9200 Corporate Boulevard
Rockville, Maryland 20850

If you have any questions concerning this approval order, please contact Mr. Colin Pollard at (301) 594-1180.

Sincerely yours,

for Susan Alpert, Ph.D., M.D.
Director
Office of Device Evaluation
Center for Devices and
Radiological Health

Enclosure

2/12/97

CONDITIONS OF APPROVAL FOR AN HDE

I. APPROVED LABELING

As soon as possible and before commercial distribution of the device, the holder of an HDE should submit three copies of the approved labeling in final printed form as an amendment to the HDE. The supplement should be submitted to the Document Mail Center (HFZ-401), Office of Device Evaluation, Center for Devices and Radiological Health, Food and Drug Administration (FDA), 9200 Corporate Blvd., Rockville, Maryland 20850.

II. ADVERTISEMENTS

Advertisements and other descriptive printed materials issued by the HDE holder or private label distributor with respect to this device should not recommend or imply that the device may be used for any use that is not included in the FDA approved labeling for the device. Since the FDA approval order has restricted the sale, distribution and use of the device to prescription use in accordance with 21 CFR 801.109 and specified that this restriction is being imposed in accordance with the provisions of section 520(e) of the Federal Food, Drug, and Cosmetic Act (the act) (21 U.S.C. 360j(e)) under the authority of section 515(d)(1)(B)(ii) of the act (21 U.S.C. 360e(d)(1)(B)(ii)), all advertisements and other descriptive printed material issued by the holder or distributor with respect to the device shall include a brief statement of the intended uses of the device and relevant warnings, precautions, side effects, and contraindications.

III. HDE SUPPLEMENTS

Before making any change affecting the safety or probable benefit of the device, the HDE holder should submit a supplement for review and approval by FDA unless a "Special HDE Supplement" is permitted as described under 21 CFR 814.39(d)(2) or an alternate submission is permitted as described under 21 CFR 814.39(e). All HDE supplements or alternate submissions must comply with the applicable requirements under 21 CFR 814.39 of the Premarket Approval (PMA) regulation and under 21 CFR 814.106 of the Humanitarian Device Exemption regulation.

Since all situations which require an HDE supplement cannot be briefly summarized, please consult the HDE regulation for further guidance. The guidance provided below is only for several key instances. In general, an HDE supplement must be submitted:

1) When unanticipated adverse effects, increases in the incidence of anticipated adverse effects, or device failures necessitate a labeling, manufacturing, or device modification; or

2) If the device is to be modified, and animal/laboratory or clinical testing is needed to determine if the modified device remains safe and continues to provide probable benefit.

HDE supplements submitted under 21 CFR 814.39(d)(2) "Special HDE Supplement - Changes Being Effected" are limited to the labeling, quality control, and manufacturing process changes as specified under this section of the regulation. This provision allows for the addition of, but not the

replacement of previously approved, quality control specifications and test methods. These changes may be implemented upon acknowledgment by FDA that the submission is being processed as a "Special HDE Supplement - Changes Being Effected." Please note that this acknowledgment is in addition to that issued by the Document Mail Center for all HDE supplements submitted. This procedure is not applicable to changes in device design, composition, specifications, circuitry, software, or energy source.

Alternate submissions permitted under 21 CFR 814.39(e) apply to changes that otherwise require approval of an HDE supplement before implementation and include the use of a *30-day HDE supplement* or *periodic postapproval report*. FDA must have previously indicated in an advisory opinion to the affected industry or in correspondence to the HDE holder that the alternate submission is permitted for the change. Before this can occur, FDA and the HDE holder must agree upon any needed testing, the testing protocol, the test results, the reporting format, the information to be reported, and the alternate submission to be used.

Please note that unlike the PMA process, a supplement may not be submitted for a new indication for use for a humanitarian use device (HUD). An HDE holder seeking a new indication for use for an HUD approved under the provisions of Subpart H of 21 CFR 814, must obtain a new designation of HUD status for the new indication for use and submit an original HDE application in accordance with §814.104. The application for the new indication for use may incorporate by reference any information or data previously submitted to the agency.

IV. POSTAPPROVAL RECORD KEEPING REQUIREMENTS

An HDE holder is required, for the duration of the period that a HUD is approved for marketing, to maintain records of the names and addresses of the facilities to which the HUD has been shipped, correspondence with reviewing institutional review boards (IRBs), as well as any other information requested by a reviewing IRB or FDA.

V. POSTAPPROVAL REPORTING REQUIREMENTS

Continued approval of the HDE is contingent upon the submission of postapproval reports required under 21 CFR 814.84 and 21 CFR 814.126 and extension requests under 21 CFR 814.120. In order to avoid duplicative reporting, the periodic postapproval reports required under 21 CFR 814.84(b) may be combined with a request for extension. Postapproval reports for supplements approved under the original HDE should be included in the next and subsequent periodic reports for the original HDE unless otherwise specified in the approval order for the HDE supplement.

A. As specified by section 520(m) of the act, an HDE is valid for a term of 18 months from the date of approval but can be extended at 18-month intervals. In order to avoid the risk of a lapse in marketing approval, the holder of an HDE wishing to obtain an extension should submit such a request to FDA at least 90 days prior to the expiration of the HDE. Three copies of the request for extension, with the outside envelope plainly marked "Request for Extension of HDE Approval", should be submitted to the Document Mail

Center (HFZ-401), Office of Device Evaluation, Center for Devices and Radiological Health, Food and Drug Administration, 9200 Corporate Blvd., Rockville, Maryland 20850. The submission should state the applicant's name and address, the HDE number, and should include the following information based upon the first 12 months of experience with the device following the most recent HDE approval or extension:

(1) An update of the information required under §814.102(a) in a separately bound volume;

(2) An update of the information required under §§814.104(c)(2), (c)(3), and (c)(5);

(3) The number of devices that have been shipped or sold and, if the number shipped or sold exceeds 4,000 in a gvien year, an explanation and estimate of the number of devices used per patient. If a single device is used on multiple patients, the applicant shall submit an estimate of the number of patients treated or diagnosed using the device together with an explanation of the basis for the estimate;

(4) Information describing the applicant's clinical experience with the device. This shall include safety information that is known or reasonably should be known to the applicant, a summary of medical device reports made pursuant to 21 CFR 803, any data generated from postmarketing studies, and information (whether published or unpublished) that is known or reasonably expected to be known by the applicant that may affect an evaluation of the safety of the device or that may affect the statement of contraindications, warnings, precautions, and adverse reactions in the device labeling; and

(5) A summary of any changes made to the device in accordance with supplements submitted under §§814.108 and 814.39(b).

B. If the HDE holder does not wish to maintain marketing approval for the humanitarian use device and thus does not submit an extension request, a final report should be submitted no later than 90 days following the expiration of the period of marketing approval. Three copies, identified as "Final Report" and bearing the applicable HDE reference number, should be submitted to the Document Mail Center at the address provided above. The final report should include the following information required by 21 CFR 814.126(b)(1):

(1) An estimate of the number of patients who were treated or diagnosed with the device and the number of devices shipped or sold since initial marketing approval under the humanitarian device exemption. (If the number of devices shipped or sold exceeds 4,000 per year, an explanation and estimate of the number of devices used per patient shall be included. Similarly, if a single device is used on multiple patients, the applicant shall submit an estimate of the number of

patients treated or diagnosed using the device together with an explanation of the basis for the estimate.);

(2) Information regarding the retrieval or disabling of unused devices, a summary of results and conclusions with regard to the clinical use of the device, and a summary of the medical device reports submitted under 21 CFR 803; and

(3) A summary and bibliography of published and unpublished data, reports, and studies involving the device that are known to or that reasonably should be known to the applicant and were not previously submitted to FDA. If, after reviewing the summary and bibliography, FDA concludes that a copy of the unpublished or published information is needed, FDA will notify the holder that copies shall be submitted.

C. **ADVERSE REACTION AND DEVICE DEFECT REPORTING**

As provided by 21 CFR 814.82(a)(9), FDA has determined that in order to provide continued reasonable assurance of the safety and probable benefit of the device, the holder shall submit three copies of a written report identified, as applicable, as an "Adverse Reaction Report" or "Device Defect Report" to the Document Mail Center (HFZ-401), Office of Device Evaluation, Center for Devices and Radiological Health, Food and Drug Administration, 9200 Corporate Blvd., Rockville, Maryland 20850. Such reports should be submitted within 10 days after the HDE holder receives or has knowledge of information concerning:

(1) A mixup of the device or its labeling with another article.

(2) Any adverse reaction, side effect, injury, toxicity, or sensitivity reaction that is attributable to the device and

(a) has not been addressed by the device's labeling or

(b) has been addressed by the device's labeling, but is occurring with unexpected severity or frequency.

(3) Any significant chemical, physical or other change or deterioration in the device or any failure of the device to meet the specifications established in the approved HDE that could not cause or contribute to death or serious injury but are not correctable by adjustments or other maintenance procedures described in the approved labeling. The report shall include a discussion of the HDE holder's assessment of the change, deterioration or failure and any proposed or implemented corrective action by the firm. When such events are correctable by adjustments or other maintenance procedures described in the approved labeling, all such events known to the holder shall be included in the "Request for Extension of HDE Approval" described under "Postapproval Reports" above unless otherwise specified in the conditions of approval for this HDE. This postapproval report shall appropriately

categorize these events and include the number of reported and otherwise known instances of occurrence for each category during the reporting period. Additional information regarding the events discussed above shall be submitted by the HDE holder when determined by FDA to be necessary to provide continued reasonable assurance of the safety and probable benefit of the device for its intended use.

D. **REPORTING UNDER THE MEDICAL DEVICE REPORTING REGULATION**

The Medical Device Reporting regulation (MDR) (21 CFR 803) became effective on April 11, 1996 and requires that all manufacturers and importers of medical devices, including *in vitro* diagnostic devices, report to FDA whenever they receive or otherwise become aware of information that reasonably suggests that one of its marketed devices:

(1) may have caused or contributed to a death or serious injury; or

(2) has malfunctioned and that the device or any other device marketed by the manufacturer or importer would be likely to cause or contribute to a death or serious injury if the malfunction were to recur.

Events subject to reporting under the MDR regulation may also be subject to the above "Adverse Reaction and Device Defect Reporting" requirements. FDA has determined, however, that such duplicative reporting is unnecessary. Therefore, whenever an event involving a device is subject to reporting under both the MDR regulation and the "Adverse Reaction and Device Defect Reporting" requirements, the report should be submitted in compliance with Part 803 and identified with the HDE reference number to the Division of Surveillance Systems (HFZ-531), Center for Devices and Radiological Health, Food and Drug Administration, 1350 Piccard Drive, Rockville, Maryland 20850. For questions regarding the MDR regulation, please call (301) 594-2735.

Events included in periodic reports to the HDE that have also been reported under the MDR regulation must be so identified in the periodic report to the HDE to prevent duplicative entry into FDA information systems.

Copies of the MDR regulation and an FDA publication entitled, "An Overview of the Medical Device Reporting Regulation," are available by written request to the following address, by telephone at 1(800) 638-2041, or at its internet address "http://www.fda.gov/cdrh/dsmamain.html".

Division of Small Manufacturers Assistance (HFZ-220)
Center for Devices and Radiological Health
Food and Drug Administration
1350 Piccard Lane
Rockville, Maryland 20850

SUMMARY OF SAFETY AND PROBABLE BENEFIT

I. GENERAL INFORMATION

Device Generic Name: Fetal Bladder Stent

Device Trade Name: Harrison Fetal Bladder Stent (Lowery Modification)

Applicant's Name and Address:

Cook OB/GYN
1100 West Morgan Street
Spencer, IN 47460

Humanitarian Device Exemption (HDE) Number: H960001

Date of Humanitarian Use Device Designation: November 25, 1996

Date of Panel Recommendation: The HDE was not taken to panel. However, a previous PMA for this device was reviewed by the Obstetrics and Gynecology Devices Panel on July 23, 1996.

Date of Good Manufacturing Practices Inspection: A pre-approval inspection for the HDE was not performed. However, a routine GMP inspection was performed on August 9, 1995.

Date of Notice of Approval to Applicant: FEB 14 1997

II. INDICATIONS FOR USE

The Harrison Fetal Bladder Stent (Lowery Modification) is intended for use in fetal urinary tract decompression following the diagnosis of fetal post-vesicular obstructive uropathy in fetuses of 18 to 32 weeks gestational age.

The following procedures should be conducted to determine if a fetus is a candidate for the Harrison Fetal Bladder Stent (Lowery Modification):

a. ultrasound evaluation demonstrating a lower obstructive uropathy (e.g., bilateral hydronephrosis, utereostasis, megacystitis or oligohydramnios), and ruling out the presence of other congenital anomalies;
b. fetal karyotype to rule out chromosomal anomalies;

c. serial vesicocentesis to evaluate the fetal renal function through fetal urinary biochemical parameters. The parameters and their respective cut-off values are shown below:

$Na^+ < 100$ mg/dL
$Ca^{++} < 8$ mg/dL
Osmolarity < 200 mOsm/L
β-2-μglobulin < 4 mg/L
protein < 20 mg/L

III. DEVICE DESCRIPTION

The Harrison Fetal Bladder Stent (Lowery Modification) is a double pigtail stent with an outer diameter of 5 Fr and a length ranging from 1.5 - 3.5 cm. The distal pigtail is a single coil that is oriented perpendicular to the stent to allow the pigtail to lie flat along the fetal abdomen. The proximal pigtail is a double coil, and it is oriented perpendicular to the stent in order to enhance retention. Both the proximal and distal coils have 4 sideports. The Lowery modification stent set includes a 13 gauge, 18 cm trocar/stylet needle assembly, a 5 French, 24 cm positioner, and an 0.97 mm diameter, 40 cm PFE-coated guidewire. The trocar tip is mechanically processed for enhanced visualization during ultrasound.

IV. CONTRAINDICATIONS, WARNINGS AND PRECAUTIONS

The Harrison Fetal Bladder Stent (Lowery Modification) should not be applied if any of the following conditions are present

- severe congenital abnormalities that jeopardize neonatal survival
- abnormal karyotype
- renal cortical cysts or evidence of renal failure

The warnings and precautions can be found in the Professional Labeling (Attachment 1).

V. ADVERSE EFFECTS OF THE DEVICE ON HEALTH

A. Reported Adverse Effects

The only adverse event reported with the use of the Harrison Fetal Bladder Stent (Lowery Modification) is one case of maternal chorioamnionitis out of 14 cases.

B. Reported Side Effects

From 18 stent placements in 14 fetuses, two types of side effects were reported.

Stent migration (6 cases)
Stent blockage (1 case)

C. Potential Adverse Events

Ascites
Maternal sepsis
Amniotic fluid leak and/or complete rupture of the membranes
Direct trauma to the fetus, such as fetal intestinal perforation
Uterine injury or bleeding, placental bleeding
Preterm labor
Spontaneous abortion

VI. ALTERNATE PRACTICES AND PROCEDURES

The only alternative procedures are periodic needle aspiration from the fetal bladder or open fetal surgery.

VII. MARKETING HISTORY

The original Harrison Fetal Bladder Stent was first manufactured by Cook Ob/GYN for Dr. Michael Harrison in 1980. The device was available on a limited basis until August 1995, with over 680 devices being distributed worldwide. The device was supplied for use in 443 patients by 213 physicians in 182 institutions. During this time, the device underwent a number of design modifications, resulting in the stent that is currently being considered in this HDE (i.e., Lowery Modification). To date, 148 Harrison Fetal Bladder Stents (Lowery Modification) have been distributed in the United States and abroad for investigational use.

The Harrison Fetal Bladder Stent (Lowery Modification) has not been withdrawn from marketing for any reason related to safety or probable benefit of the device.

VIII. SUMMARY OF STUDIES

A. Preclinical Studies

1. Mechanical and Physical Properties

The finished, radiopaque, Sof-Flex® polyurethane stents were subjected to performance testing in accordance with the recommendations stated in the "Draft Guidance for the Content of Premarket Notifications for Ureteral Stents (2/10/93)." Each test was conducted on a sample of 10 stents.

Flow Rate

Table 1. Flow rate testing (performed in accordance with ASTM F-623-89, Standard Performance Specification for Foley Catheter).

Average Flow Rate (cc/min)	Standard Deviation (cc/min)
13.80	0.43

Data from the published literature suggests that fetal urine output can range from 0.03 to 0.77 cc/min, which is well within the capacity of the stent. In addition, the flow rate for the fetal bladder sent is comparable to flow rates for legally marketed ureteral stents.

Elongation/Yield and Tensile Strength

Table 2. Elongation/yield and tensile strength (performed in accordance with ASTM D412, Test Methods for Vulcanized Rubber and Thermoplastic Rubbers and Thermoplastic Elastomers - Tension) . Mean (Standard Deviation)

Mean Break Load (lbs)	Mean Break Displacement (ins)	Mean Peak Load (lbs)	Mean Peak Displacement (ins)	Percent Elongation
6.07 (0.316)	12.25 (1.670)	6.13 (0.391)	12.14 (1.60)	607%

Note: Mean Break and Peak Load (lbs) refers to the stent's tensile strength; Mean Break and Peak Displacement (ins) refers to the stent's elongation/yield.

Reported elongation/yield and tensile strength values are comparable to legally marketed ureteral stents, which have similar stent diameters, but typically have drainage holes along the main shaft. The design of the stent allows any force/pressure to be directed

against the curls and not the main shaft. Therefore, the curls would straighten prior to the main shaft breaking.

Curl Strength

Table 3. Curl strength (performed in accordance with ASTM F.04.12.02, subcommittee assigned to develop a proposed testing specification for ureteral stents).

Stent	Maximum Mean Force (g)	Standard Deviation (g)
5 Fr / 1.5 cm length		
Distal Curl (450°)	22.5	1.7
Proximal Curl (740°)	24.9	1.3
*5 Fr / 3.5 cm length**		
Proximal Curl (360°)	27.0	1.5

* Proximal curl was stretched so that stent length was 3.5 cm and proximal curl was 360°

Reported curl strength values were comparable to legally marketed ureteral stents, which have similar stent diameters, but typically have varying numbers of drainage holes on the curls and varying curl configurations.

2. **Materials and Biocompatibility.** The Harrison Fetal Bladder Stent Set (Lowery Modification) uses the following patient-contacting materials:

Stent	-	Sof-Flex (radiopaque polyether-based polyurethane)
Positioner	-	Polyvinyl chloride
Trocar assembly	-	Medical grade stainless steel
Wire guide	-	PFE over stainless steel

The fetal bladder stent is classified as a permanent implant. To support its biocompatibility, the following biocompatibility test results were provided: acute systemic toxicity, USP pyrogenicity, cytotoxicity (MEM Elution), sensitization (Guinea Pig Maximization), Ames mutagenicity, USP intracutaneous toxicity, urinary bladder irritation, and USP muscle implantation (30 days). This testing was not conducted on the fetal bladder stent itself, but on a urodynamic catheter that is made from the same Sof-Flex polyurethane and undergoes the same processing as the fetal bladder stent. In addition, Cook performed 90-day implantation on the fetal bladder stent. This testing is in accordance with ISO 10993-1:1992, "Biological Evaluation of Medical Devices," and is adequate to demonstrate that the fetal bladder stent is biocompatible for the proposed intended use.

The trocar assembly, positioner, and wire guide are external communicating devices with limited contact duration (less than 1 hour). The medical grade stainless steel used for the trocar has a long history of safe use in medical devices. The polyvinyl chloride positioner and wire guide have a long history of use with other Cook stent sets, and Material Safety Data Sheets were provided. This information is adequate to demonstrate that these components are biocompatabile for the proposed intended use.

B. Clinical Studies

1. Retrospective Clinical Study

At the time of HDE submission, 148 Harrison Fetal Bladder Stent Sets (Lowery Modification) had been placed in 75 patients. Outcome data from 20 fetuses who were candidates for the stent is included in the HDE. ***It is important to note that the data presented in the HDE are based on a nonrandom group of patients and physicians, of which only a small proportion have responded to the sponsor's retrospective survey. The rates and proportions computed from these data are subject to bias, and the ability to generalize these rates to a larger patient population is limited.***

Table 4. Outcome data (n=20).

6 fetuses did not receive the stent
1 survived to delivery
5 did not survive to delivery
14 fetuses received the stent
11 survived to delivery
6 survived to discharge
5 did not survive to discharge
1 did not survive to delivery
2 were electively terminated

The clinical data presented in the HDE were obtained from retrospective case reports. No information is available about the cause of death for the one fetus who died prior to delivery or the five fetuses who died prior to discharge following stent placement. However, all of these fetuses are known to have had significant renal disease, as evidenced by biochemical parameters and/or anatomical abnormalities. These conditions are associated with an extremely high fetal mortality rate.

The submission also includes information on the frequency of need for replacement stents. Six replacements were needed due to stent migration, and one was needed due to partial stent obstruction.

Table 5. Replacement stents.

11 fetuses received a single stent
3 fetuses required a replacement stent 2 required a total of two stents 1 required a total of three stents

The length of time that the stent was in place was available for 9 stent placements in 7 fetuses. The data are shown below:

Table 6. Duration of stent placement (days)

0	2-3	3	5	8	14	21	42	70

As previously noted, due to the limited nature of the clinical data provided in the submission, it is not possible to extrapolate these results to the population in general. However, the limited clinical data suggests that the device will not expose patients to an unreasonable or significant risk of illness or injury, and that the probable benefit to health from using the device outweighs the risk of injury or illness.

2. Supporting evidence from the published literature

King (1993) estimates the incidence of fetal hydronephrosis at about 1 in 800 pregnancies. He reports that the condition resolves spontaneously in about half of these cases, with the least severe cases the most likely to spontaneously resolve. This is consistent with Gunn et al. (1995), who report that in one series of 42 fetuses, congenital hydronephrosis improved in utero in 28%, was stable in 36%, and progressed in 37% of fetuses. However, when addressing only the most severely compromised fetuses (i.e., those who would be candidates for this stent) Harrison (1990) says: "When high grade early obstruction reduces urine output and produces oligohydramnios, pulmonary hypoplasia secondary to thoracic compression leads to post-natal respiratory insufficiency and death." Vintzileos (1992) notes that for these fetuses, "..in utero surgical therapy may be the only way of preventing the serious consequences of the disease process."

There are numerous articles in the published literature discussing the use of bladder stents for the treatment of fetal post-vesicular obstructive uropathy. For example, Camosy (1995) notes in her review of invasive fetal procedures that:

"Urinary diversion with a vesicoamniotic shunt placed under ultrasound guidance is now a routine procedure." In a review of various indications for percutaneous intrauterine fetal shunting, Vintzileos (1992) reports that: "Initial experience has suggested that prenatal surgical therapy may be of value in distal obstructive uropathy." While these reports may not specifically refer to the Harrison Fetal Bladder Stent (Lowery Modification), they do support the use of fetal bladder stents in the treatment of fetal post-vesicular obstructive uropathy.

IX. CONCLUSIONS DRAWN FROM STUDIES

The results from the 90-day implantation testing of the stent, in conjunction with the history of safe use of the proposed materials, provides adequate assurance that the materials are biocompatabile for the proposed intended use. Performance testing to assess the mechanical properties and flow performance of the stent demonstrates that the design is appropriate for the proposed intended use.

The limited clinical data presented are not adequate to definitively establish the safety and effectiveness of the device. However, these preliminary findings do suggest that the device provides some clinical benefit to fetuses, who are otherwise unlikely to survive. In addition, there is evidence in the published medical literature that the use of vesicoamniotic stents to treat posterior obstructive uropathy has become well-accepted among perinatologists who care for high-risk pregnancies.

In conclusion, the preclinical toxicology and performance studies provide reasonable assurance that device materials and design are appropriate for the proposed intended use. The limited clinical data suggests that the device will not expose patients to an unreasonable or significant risk of illness or injury, and that the probable benefit to health from using the device outweighs the risk of injury or illness, taking into account the probable risks and benefits of currently available devices or alternative forms of treatment.

X. PANEL RECOMMENDATIONS

On July 23, 1996, the Obstetrics and Gynecology Devices Advisory Panel met to consider the PMA for the Harrison Fetal Bladder Stent (Lowery Modification). The Panel determined that the limited clinical data that Cook had collected to date were inadequate to provide the assurance of safety and effectiveness required to recommend approval of a PMA. However, the Panel concluded that this is a life-threatening issue for the fetus, and that some device needs to be available. The Panel further encouraged Cook to continue in its efforts to bring the stent to market.

XI. CDRH DECISION

Three months after the panel meeting ,on October 24, 1996, the new Humanitarian Device Exemption Regulation became effective. CDRH recognized, given its understanding of the intent of the Panel deliberations and recommendations, and the intent of Congress in formulating this statutory provision, that the Harrison Bladder Stent would be appropriate for this regulatory mechanism. Cook OB/GYN subsequently submitted this HDE application. CDRH has determined that, based on the data submitted in the HDE, the Harrison Fetal Bladder Stent (Lowery Modification) will not expose patients to an unreasonable or significant risk of illness or injury, and the probable benefit to health from using the device outweighs the risk of injury or illness, and issued an approval order on February 14, 1997.

XII. APPROVAL SPECIFICATIONS

Directions for Use: See the Labeling (Attachment 1)

Warning, Hazards to Health for use of the Device: See indications, contraindications, warnings, precautions and adverse effects in the Labeling (Attachment 1).

REFERENCES

Camosy, Pamela. Fetal Medicine: Treating the unborn patient, American Family Physician, 52:1385-1392, 1995.

Gunn, T.R. et al. Antenatal diagnosis of urinary tract abnormalities by ultrasonography after 28 week's gestation: Incidence and outcome. American Journal of Obstetrics and Gynecology, 172:479-486, 1995.

Harrison, M.R., Golbus, M.S. and R.A. Filly. The Unborn Patient, Florida: Grunn and Stratton, p.277-341, 1990.

King, L.R. Fetal hydronephrosis: What is the urologist to do? Urology, 42:229-231, 1993.

Vinzileos, A.M., Campbell, W.A. & J.F. Rodis. Percutaneous intrauterine fetal shunting, (p.110-113) in Operative Obstetrics, ed. L.Iffy et al, McGraw-Hill, 1992.

Professional Labeling
Harrison Fetal Bladder Stent Set (Lowery Modification)

Humanitarian Device. Authorized by Federal law for use in the treatment of fetal post-vesicular obstructive uropathy. The effectiveness of this device for this use has not been demonstrated.

Caution: Federal law restricts this device to sale, distribution, and use by or on the order of a physician with appropriate training and experience.

DEVICE DESCRITPION

The Harrison Fetal Bladder Stent (Lowery Modification) is a double pigtail stent with an outer diameter of 5 Fr and a length ranging from 1.5 - 3.5 cm. The distal pigtail is a single coil that is oriented perpendicular to the stent to allow the pigtail to lie flat along the fetal abdomen. The proximal pigtail is a double coil, and it is oriented perpendicular to the stent in order to enhance retention. Both the proximal and distal coils have 4 sideports.

The Lowery modification stent set includes the following:

- Multi-length double pigtail stent with a usable length between the pigtails of 1.5cm - 3.5cm
- 0.038 inch (0.97mm) diameter TFE coated stainless steel wire guide 40cm long
- 5.0 French positioner 24cm long
- 13 gage Echotip® trocar needle 18cm long

  The trocar tip is mechanically processed for enhanced visualization during ultrasound.

INDICATIONS FOR USE:

The Harrison Fetal Bladder Stent (Lowery Modification) is intended for use in fetal urinary tract decompression following the diagnosis of fetal post-vesicular obstructive uropathy in fetuses of 18 to 32 weeks gestational age.

CONTRAINDICATIONS:

The Harrison Fetal Bladder Stent (Lowery Modification) should not be applied if any of the following conditions are present

- severe congenital abnormalities that jeopardize neonatal survival
- abnormal karyotype
- renal cortical cysts or evidence of renal failure

WARNINGS

1. Implantation of the Harrison Fetal Bladder Stent may result in leakage of amniotic fluid and/or complete rupture of the membranes.

2. Implantation of the Harrison Fetal Bladder Stent carries the possible risk of infection and the development of chorioamnionitis. This could lead to the need for intervention, including termination of the pregnancy, and in rare cases, loss of the uterus.

3. The procedure to implant the Harrison Fetal Bladder Stent carries the risk of premature labor which could lead to premature delivery, and, in rare cases, damage to the uterus.

4. Once the stent is implanted, there is the possibility that it may become obstructed or dislodged, resulting in the need for repeated stent placements.

PRECAUTIONS

1. Patient evaluation

   A complete medical history should be obtained to determine conditions that might influence the selection of the procedure or to identify conditions that are absolute or relative contraindications to surgery.

   Physicians should carefully evaluate each case, and only use the stent where there is the potential for significant renal or pulmonary impairment if no intervention is made.

   Evidence of residual renal function must be established according to established protocol prior to stent placement.

The following procedures should be conducted to determine if a fetus is a candidate for the Harrison Fetal Bladder Stent:

a. ultrasound evaluation demonstrating a lower obstructive uropathy (e.g., bilateral hydronephrosis, utereostasis, megacystitis or oligohydramnios), and ruling out the presence of other congenital anomalies;
b. fetal karyotype to rule out chromosomal anomalies;
c. serial vesicocentesis to evaluate the fetal renal function through fetal urinary biochemical parameters. The parameters and their respective cut-off values are shown below:

$Na^+ < 100$ mg/dL
$Ca^{++} < 8$ mg/dL
Osmolarity < 200 mOsm/L
β-2-μglobulin < 4 mg/L
protein < 20 mg/L

2. Patient Counseling

Prior to implantation of the stent, the patient should be fully informed about alternative procedures and possible side effects and complications. Once patient assessment is complete and a patient is identified as a potential candidate, it is strongly recommended that the patient be given counseling by the physician and other allied health personnel, including genetic counselors, perinatal nurses, perinatal nurse practitioners, or social workers. The patient should be encouraged to discuss openly and fully any questions she may have concerning the Harrison Fetal Bladder Stent. The following may serve as an outline of the issues for discussing and advising the patient:

a. Explain the patient's individual condition in depth

b. Due to the puncture of the uterus and membranes, this procedure carries the risk of leakage of amniotic fluid and/or complete rupture of membranes.

c. Because this is an invasive procedure, this procedure carries the risk of infection and the development of chorioamnionitis. This could lead to the need for intervention, including termination of the pregnancy, and in rare cases, loss of the uterus.

d. Because there is instrumentation of the uterus, this procedure carries the risk of premature labor which could lead to premature delivery, and, in rare cases, damage to the uterus.

e. In spite of efforts to assess the baby's renal function prior to placement of the stent, the potential exists for additional renal failure or additional compromise that was either not recognized or that develops following stent placement.

f. Even if the procedure is successful and the baby survives birth, there might already be some renal damage which could lead to renal transplant at some point in the baby's life.

g. Stents may become obstructed or dislodged resulting in the need for repeated stent placements, either at the time of the original stent placement or later in the pregnancy depending on the time when the original stent becomes obstructed or dislodged.

h. Provide the patient with a copy of the Patient Information Booklet.

3. Clinical Usage

a. For each procedure, use only stents enclosed in the sealed, sterile package.
b. Physicians should be thoroughly familiar with the use of the Harrison Fetal Bladder Stent prior to performing any procedure.

Fetal bladder stents are intended for use by physicians trained and experienced in techniques for fetal bladder stent placement.

ADVERSE EVENTS

The following adverse events have been reported with the use of the Harrison Fetal Bladder Stent: maternal chorioamnionitis.

The following side effects have been reported with the use of the Harrison Fetal Bladder Stent: stent migration and stent blockage.

Potential adverse events and side effects associated with use of the stent could include:

Ascites
Maternal sepsis
Amniotic fluid leak
Direct trauma to the fetus, such as fetal intestinal perforation
Uterine injury or bleeding, placental bleeding
Preterm labor
Spontaneous abortion

CLINICAL STUDIES

At the time of HDE submission, 148 Harrison Fetal Bladder Stent Sets (Lowery Modification) had been placed in 75 patients. Outcome data from 20 fetuses who were candidates for the stent is included in the HDE. ***It is important to note that***

the data presented in the HDE are based on a nonrandom group of patients and physicians, of which only a small proportion have responded to the sponsor's retrospective survey. The rates and proportions computed from these data are subject to bias, and the ability to generalize these rates to a larger patient population is limited.

Table 4. Outcome data (n=20).

6 fetuses did not receive the stent
1 survived to delivery
5 did not survive to delivery
14 fetuses received the stent
11 survived to delivery
6 survived to discharge
5 did not survive to discharge
1 did not survive to delivery
2 were electively terminated

The clinical data presented in the HDE were obtained from retrospective case reports. No information is available about the cause of death for the one fetus who died prior to delivery or the five fetuses who died prior to discharge following stent placement. However, all of these fetuses are known to have had significant renal disease, as evidenced by biochemical parameters and/or anatomical abnormalities. These conditions are associated with an extremely high fetal mortality rate.

The submission also includes information on the frequency of need for replacement stents. Six replacements were needed due to stent migration, and one was needed due to partial stent obstruction.

Table 2. Replacement stents.

11 fetuses received a single stent
3 fetuses required a replacement stent
2 required a total of two stents
1 required a total of three stents

The length of time that the stent was in place was available for 9 stent placements in 7 fetuses. The data are shown below:

Table 3. Duration of stent placement (days)

0	2-3	3	5	8	14	21	42	70

As previously noted, due to the limited nature of the clinical data provided in the submission, it is not possible to extrapolate these results to the population in general. However, the limited clinical data suggests that the device will not expose patients to an unreasonable or significant risk of illness or injury, and that the probable benefit to health from using the device outweighs the risk of injury or illness.

INSTRUCTIONS FOR USE

PATIENT PREPARATION:

1. Perform final ultrasound to ascertain exact position of fetus.

   Manipulation of the fetus *in utero* may be necessary to attain a more ideal fetal position for the performance of the procedure.

2. Sedate the mother if deemed advisable.

   Sedation of the fetus is usually not necessary. However, if the fetus will require significant manipulation or there is excessive fetal movement, sedation of the fetus *in utero* may be advisable.

3. Ascertain during the ultrasound if there is an adequate window of fluid within the amniotic space for the proximal stent coil to form. Often, due to the presence of oligohydramnios, there is an inadequate window of fluid for the performance of the procedure. If the fluid window is insufficient, amnio-infusion may be required.

4. For amnio-infusion, instill between 500cc and 1000cc of fluid within the amniotic space. Warmed sterile saline is suggested.

   CAUTION: Do not microwave IV bags. Warm under running water or in an approved warming device.

Actual amount of fluid required to achieve an adequate fluid window is dependent on individual patient condition.

5. At the time of amnio-infusion, it is advisable to administer intra-amniotic antibiotics. Due to the threat of chorioamnionitis, a broad spectrum antibiotic such as Nafcillin (500mg-1000mg) or a cephalosporin (1gr-2gr) that covers penicillin-resistant staph is recommended.

    - **Administration of specific antibiotics and dosages is dependent on individual patient conditions, and should be determined by the physician.**

    - **The use of tocolytic agents during and after the procedure may be advisable. Close observation of the fetal condition and any signs of pre-term labor are mandatory.**

ASSEMBLY INSTRUCTIONS

1. Just prior to the placement procedure, load the positioner onto the wire guide.

2. Load the stent onto the wire guide by introducing the wire guide into the multi-length coil of the stent until 3mm-4mm of the wire guide extends beyond the distal coil of the stent. Place non-flared end of the positioner against the end of the multi-length (proximal) stent coil. *Figure A.*

Figure A

NOTE:

The single coil of the stent is the distal coil which is placed in the fetal bladder. Be sure the stent is properly loaded on the wire guide before the placement procedure begins.

CAUTION:

To assure the stent coils maintain optimum memory, do not load the stent onto the wire guide until immediately prior to placement through the needle.

IMPLANTING THE HARRISON FETAL BLADDER STENT

1. Prepare the skin puncture site with an antibiotic skin prep. A small wheal of local anesthetic should be applied to the puncture site.

2. Using a scalpel with a No. 11 blade, make a small nick in the skin just large enough to allow passage of the 13 gage trocar needle.

3. Using ultrasonic guidance, advance the trocar percutaneously through the mother's abdominal and uterine walls and into the fetal bladder.

   If amnio-infusion was not necessary to produce adequate fluid window, antibiotics may be administered through the needle after amniotic placement but prior to fetal bladder puncture.

   Make sure that a 2cm window of fluid is available between the fetal bladder and the uterine wall.

4. Trocar tip should be advanced 5mm-10mm into the fetal bladder.

   CAUTION: If the trocar is advanced too far into an over-distended bladder, the proximal stent coil may not have room to form and improper placement may result.

   NOTE: Once proper trocar and needle positioning within the fetal bladder has been verified, withdraw the trocar and immediately place thumb over the top of the needle hub to prevent premature decompression. A full fetal bladder is desirable to enhance visualization of coil formation and positioning.

5. While stabilizing the needle, advance the stent assembly into the needle.

6. After the positioner has entered the hub of the needle, stabilize the positioner and remove the wire guide.

   The entire stent must be advanced through needle hub and into the needle before removing the wire guide.

7. The positioner can now be utilized to advance the stent coil into the fetal bladder. The first ink mark on the positioner indicates that the single pigtail has completely exited the needle when the mark is in line with the needle hub. *Figure B.*

Figure B

8. Once the straightened pigtail has coiled in the fetal bladder, the needle is very slowly withdrawn over the positioner to the second ink mark, while stabilizing the positioner with one hand. *Figure C.*

Figure C

CAUTION: This action is important to prevent withdrawal of the stent from the fetal bladder and ensure coiling of the remaining pigtail coil in the amniotic fluid.

CAUTION: If the needle tip is out of the fetus and at the edge of the uterus (fluid window) before reaching the second ink mark, the stent may be advanced into the fluid window with the positioner.

CAUTION: Exacting care must be exercised to avoid leaving any segment of the stent in the uterine wall. The extra-fetal segment of the stent will coil to prevent entry of the entire stent into the fetal bladder. The intra-vesical coil will prevent expulsion of the stent from the fetus.

9. Once proper positioning of the stent is assured, the positioner and the needle are removed together.

10. Document proper stent positioning with ultrasound evaluation.

11. Observe the fetal bladder to assure stent is functioning properly. Proper positioning is normally evidenced by rapid decompression of the fetal bladder.

12. Monitor the fetus to assure there is no fetal distress or premature labor.

FOLLOW-UP:

1. Follow-up is performed by serial ultrasound examinations.

2. Initial follow-up ultrasound examination should be performed within 48 - 72 hours following the placement procedure.

3. Continuing follow-up ultrasound examinations should be performed on a weekly basis for the remainder of the pregnancy.

REMOVAL OF THE STENT

The stent should remain in place until appropriate neonatal and pediatric urologic evaluation has taken place. Once the time for the removal of the sent has been determined, it should be removed using standard aseptic techniques.

[redacted]

RELIEVING PRESSURE IN MY BABY'S OBSTRUCTED URINARY TRACT USING THE HARRISON FETAL BLADDER STENT SET

Humanitarian Device: Authorized by Federal law for use in the treatment of fetal post-vesicular obstructive uropathy. The effectiveness of this device for this use has not been demonstrated.

Definitions

Amniocentesis: A procedure in which a sample of the amniotic fluid is taken and studied.

Amniotic sac: The space around your baby which is filled with fluid.

Chorioamnionitis: An inflammation of the membrane surrounding your baby.

Chorionic Villus Sampling (CVS): A procedure in which a sample of the tissue in the placenta, which is the membrane surrounding your baby, is taken and studied.

Fetal karyotype: A study of your baby's chromosomes

Gestational age: The time that has passed since your baby's conception.

Lower obstructive uropathy: A blockage in the urinary tract below the bladder.

Maternal sepsis: An infection in the mother.

Open fetal surgery: The partial removal of a fetus from the uterus so surgery can be performed to correct a defect.

Urinary ascites: The leaking of urine into your baby's abdomen.

Urinary tract: The system which removes urine from the body.

Why is there pressure in my baby's urinary tract?

Normally, your baby's urine drains from the kidneys into the bladder. Then it drains through the urinary tract and into the amniotic sac. This is not happening with your baby. Your baby has a condition known as lower obstructive uropathy. This means that there is probably a blockage in your baby's urinary tract. Your baby's urine can't flow into your amniotic sac. Pressure builds up behind this blockage. If left untreated, this pressure could cause damage to your baby's lungs and kidneys. This damage could lead to stillbirth. It could cause your baby to die shortly after being born because the lungs or the kidneys aren't working. It could also cause severe physical deformities. A Harrison Fetal Bladder Stent can decompress, or relieve the pressure in, your baby's urinary tract. This happens because the urine drains through the stent from your baby's bladder into your amniotic sac. It doesn't have to go through your baby's urinary tract so there is no pressure build-up.

Are my baby and myself candidates for this procedure?

Your doctor can tell you if you and your baby could benefit from this procedure.

You and your baby might be candidates for this procedure if:

- Your baby is 18 to 32 weeks gestational age and has a blocked urinary tract.
- Your baby shows no physical deformities under a detailed ultrasound.
- A study of your baby's chromosomes, also called a fetal karyotype, shows no other serious defects.

When is this procedure usually done?

The doctor can perform this procedure if a baby has reached at least 18 weeks but no older than 32 weeks gestational age. Since each case is different, your doctor will be able to give you more information about you and your baby.

What will my doctor do to relieve the pressure in my baby's urinary tract?

You probably found out your baby might have an obstructed urinary tract during a routine ultrasound examination. You will need to have another detailed ultrasound examination. This is to make sure your baby has no physical problems.

Then, the doctor will perform a study of your baby's chromosomes. In order to do this, the doctor will have to obtain a sample of your baby's tissue to examine. The doctor does this in one of two ways. The first is chorionic villus sampling or CVS. To perform CVS, the doctor inserts a catheter into your uterus and takes a tissue sample. The second way is amniocentesis. To perform amniocentesis, the doctor inserts a needle through your abdomen and takes a sample of your amniotic fluid. This tissue or fluid is studied to make sure your baby has no other serious problems.

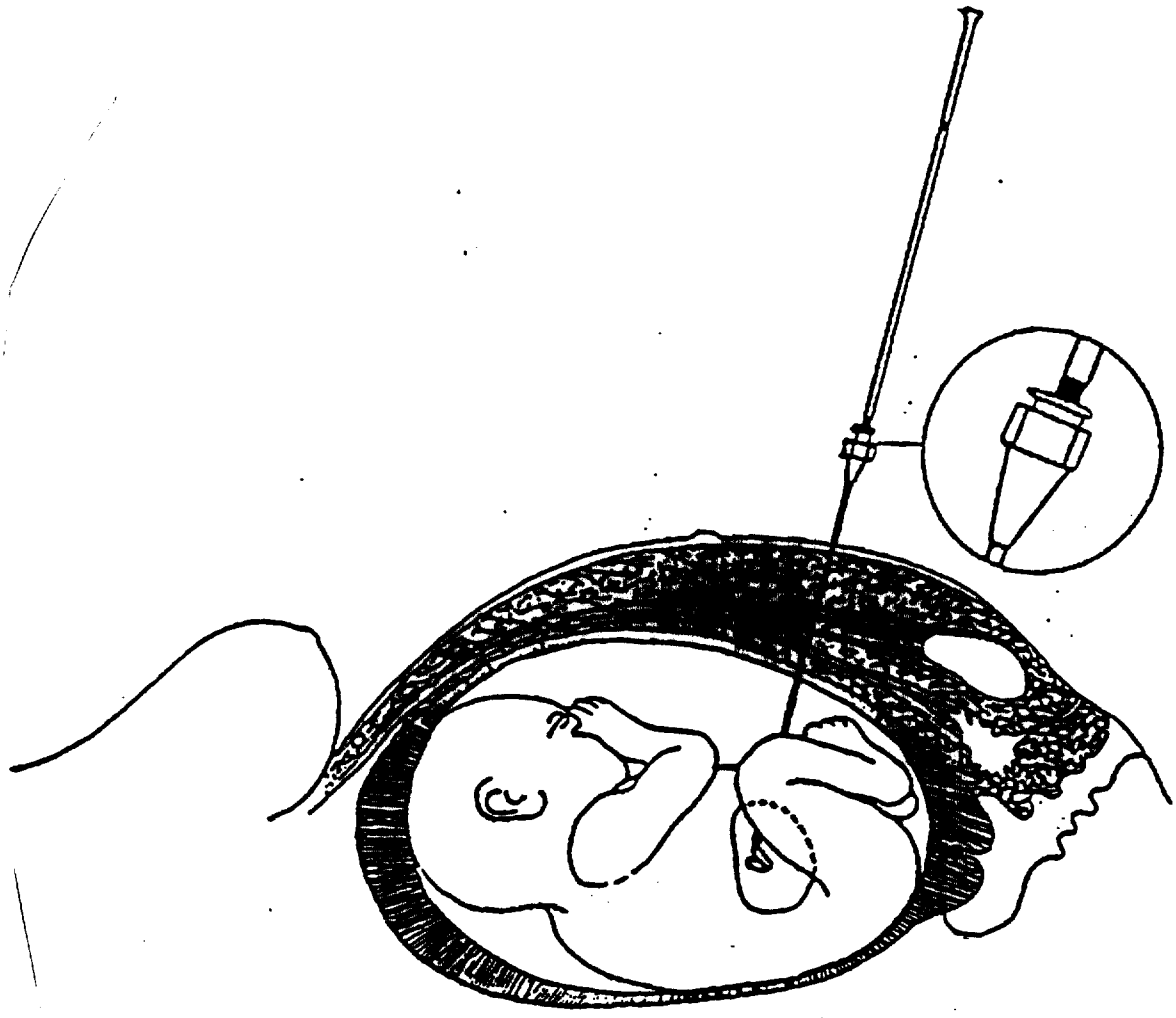
Finally, the doctor may sample your baby's urine several times over a few days. The doctor inserts a needle through your abdomen and into your baby's bladder. The doctor studies the urine to find out how well your baby's kidneys are working.

The doctor will give you antibiotics to help protect you against infection. You will receive a local anesthesia. The doctor may give you an additional sedative through an I.V. if it is necessary. Your doctor may also give your baby a sedative. The doctor does that if your baby is moving a lot or needs to be moved a great deal to find the best position.

They may also perform an amnio-infusion. To do so, the doctor will infuse, or insert, fluid if there is not enough in the space between your baby and the wall of your uterus. If you need an amnio-infusion, you will probably receive your antibiotics at the same time.

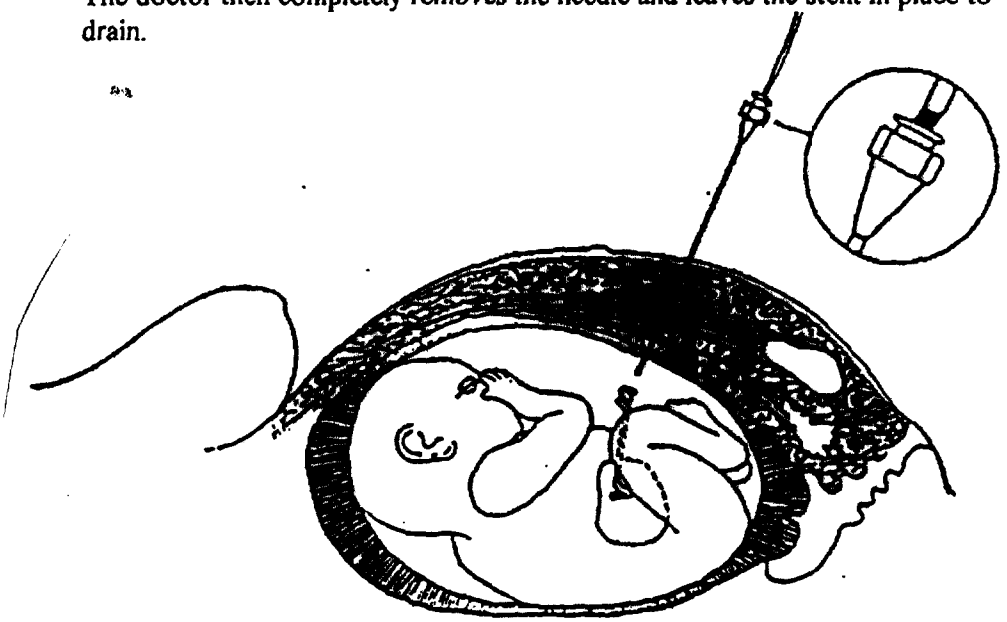
The doctor will place the Harrison Fetal Bladder Stent under ultrasound. The doctor will insert a needle through your abdomen and into the baby's bladder. This is the same as the urine sampling procedure. If you did not need amnio-infusion, you will receive your antibiotics through this needle. The doctor will inject the antibiotics while the tip of the needle is in the amniotic space, just before it enters your baby's bladder.

The Harrison Fetal Bladder Stent then goes through the needle over a wire guide until the end of it curls up inside your baby's bladder.



Coil forms in baby's bladder.

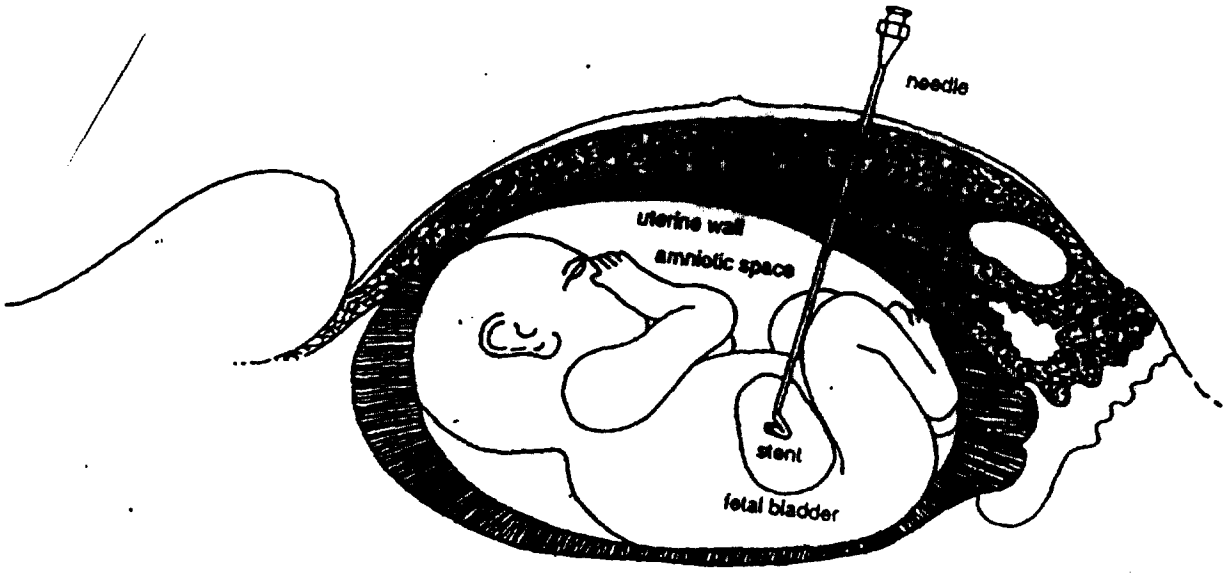
The doctor then pulls the needle back until the other end of the stent is free. This end will curl up just outside your baby's abdomen in the amniotic sac. The doctor then completely removes the needle and leaves the stent in place to drain.



Coil forms in amniotic space as needle is removed.

The whole process should only take about 15-30 minutes. The doctor will want you to stay at the hospital for observation long enough to make sure you and your baby are all right. During this time, the doctor will monitor your uterus to make sure there aren't any contractions or irritability. If this happens, the doctor will give you medicine that stops contractions. They will also monitor your baby's heart rate. They do this with an external fetal monitor. Once the doctor is sure everything is fine, you can go home.

You will need to have your first ultrasound examination within 48-72 hours after the procedure. You will need follow-up ultrasound examinations every week until your baby is born. The doctor will be examining the stent to make sure that it is working properly and hasn't moved. Sometimes, through the baby's movement or by grasping it, the stent may come out of your baby's bladder or become kinked. The stent could also become blocked. If any of these things happen, the baby's urine will no longer be able to flow into the amniotic sac. Then the doctor may need to repeat the procedure and replace the stent.



Parts of your body and your baby's body affected by the procedure.

What are the risks associated with relieving the pressure in my baby's urinary tract using the Harrison Fetal Bladder Stent?

There are some possible risks involved with the placement of the Harrison Fetal Bladder Stent.

- You might have chorioamnionitis, an inflammation of the fetal membrane. This may cause you to lose the fluid around your baby. It may cause infection in your baby or cause your baby to be stillborn. This inflammation can happen after any procedure, including placing a fetal bladder stent, in which a doctor places an instrument into your uterus during pregnancy.

- You might have urinary ascites which is the leakage of urine into your baby's abdomen. This happens when the baby's bladder stretches too far. It can result from fetal stent placement. It usually goes away by itself following the placement of a fetal bladder stent.

- Placing the fetal bladder stent could cause you to go into preterm labor. It can happen after any surgery which goes into the uterus during pregnancy.

- The doctor places a needle through your abdomen and uterus and into your baby's bladder. This makes a path for the stent. There might be some minor bleeding from your uterus or the placenta and minor injury to your uterus caused by the passing of the needle. The bleeding will usually stop after a short time.

- You might have maternal sepsis. This is an infection in you, not your baby. It can happen any time a doctor places an instrument into your uterus while you're pregnant. This is why the doctor will give you antibiotics before and after placing the stent.

- Your amniotic fluid may leak from the space between your baby and the wall of your uterus. This is another problem that can happen any time a doctor places an instrument into your uterus while you're pregnant. It may go away by itself. However, there is no other way your doctor can treat the amniotic fluid leak.

- The needle could perforate, or make a hole in, your baby's intestine. It could cause other damage if the doctor doesn't place it accurately. The doctor watches the procedure on ultrasound to make sure this doesn't happen.

- Placing a fetal bladder stent could cause you to abort or miscarry. This could happen if there is an inflammation of the fetal membrane.

- After the stent placement, your baby might move and displace, or pull the stent out of the bladder. Your baby might grab the stent and pull it out. The stent might become kinked or blocked. If this happens, your doctor may need to place another stent in your baby's bladder.

The discomfort you will have when your doctor places this stent is about the same as you had when they took a fluid sample or drained urine from your baby's bladder.

Are there any other ways to relieve the pressure in my baby's bladder?

Your doctor can insert a needle into your baby's bladder above the blockage and drain the urine to relieve the pressure. The doctor will need to do this as often as the pressure builds up to prevent damage to your baby's kidneys and lungs.

Some doctors can perform an open fetal surgery. The doctor removes your baby from your uterus far enough to repair the blockage. After the repair, the doctor would place your baby back in your uterus and your pregnancy would continue.

Deciding whether or not to relieve the pressure in my baby's urinary tract.

Deciding whether or not to relieve the pressure in your baby's urinary tract is an important decision. The decision to have the placement of the Harrison Fetal Bladder Stent or any other procedure to relieve the pressure is up to you and your partner. You do not have to have this procedure performed. You have read about the potential risks of the procedure. You must understand these risks. You should also know the potential risks of leaving this condition untreated. The pressure build-up could damage your baby's lungs and/or kidneys. This could lead to physical deformity or to your baby's death.

If you are thinking about having this procedure performed, you should discuss it with your doctor as soon as possible. Your doctor will be able to explain this procedure to you in more detail. If you decide to have the procedure, your doctor will help you schedule an appointment.

Before you make this decision, you must understand that relieving the pressure in your baby's urinary tract *will not* correct the original defect. It will not get rid of the blockage in your baby's urinary tract. It will allow urine to drain from your baby's bladder without being backed up by the blockage. Your baby's lungs and kidneys can continue to grow without pressure. After your baby is born, your doctor will still need to correct the original defect.

How can I find out more about relieving the pressure in my baby's urinary tract?

If you have any other questions, please ask your doctor.

WARNING

Following decompression of the fetal urinary tract, **IMMEDIATELY REPORT** any pain, bleeding or fluid loss to your doctor. These abnormal conditions should be closely monitored.

Printed February, 1997.