

# Laminaria in abortion

## *Use in 1368 patients in first trimester*

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DURING RECENT YEARS, there has been a revival of interest in the use of laminaria in the United States.<sup>1-6</sup> There appear to be various advantages in the use of this material for cervical dilatation, especially in first-trimester abortion. Laminaria is a species of seaweed, hygroscopic when dry, and dilates three to five times its diameter when wet. The physiologic principle of relatively atraumatic dilatation has great appeal, and the use of gas sterilization seems to have overcome earlier problems with excessive infection rates.<sup>7,8</sup>

In November, 1973, a private non-profit community abortion clinic\* was opened in Boulder, Colorado, to help with the unmet need for inexpensive first-trimester abortions in that state and community. One of the principal foundations of the original medical policies was the use of overnight cervical dilatation with laminaria because of the advantages in medical safety offered by this method. A strong counseling program was instituted simultaneously, with both medical and counseling programs building on precedents established earlier by Planned Parenthood, Preterm, and other such first-class abortion facilities in New York and Washington, D.C.

### ***Materials and Methods***

Primary contact with the clinic for most patients was through a telephone request for appointment. Patients with a last menstrual period date of more than 11 weeks in length or gestation of more than 9 weeks were usually referred elsewhere. Occasional patients with 10 weeks gestation were accepted due to hardship circumstances. Patients with histories of hypertension, bleeding tendencies, neurologic disorders, extreme obesity, hospitalization for mental illness during the previous year, asthma requiring recent hospitalization, diabetes, significant heart disease, acute or chronic pelvic infection, more than five full-term pregnancies, or a desire for general anesthesia were referred elsewhere or to the Medical Director for consideration.

Upon initial acceptance, the patient was required to provide proof of a recent pelvic examination with an estimate of gestational age, or have a screening exemption by the clinic physician or nurse. Following this step, the patient had her laboratory work performed at the clinic and filled out a personal information and medical history form. She was then assigned to an individual counselor who spent forty-five minutes to one hour reviewing the circumstances of the pregnancy with the patient, her knowledge of reproduction, contraceptive methods, and the nature of the abortion procedure. This was followed by a brief interview with the clinic physician, physical examination, and placement of the laminaria.

At the time of the pelvic examination a gonorrhea culture was taken in all patients unless they had had one during the previous week, and a Papanicolaou smear was taken if indicated. The vagina was prepped with a dilute povidine-iodine solution, and the cervical canal sounded to just past the internal os to determine patency and direction. If

necessary, a single-tooth Schroeder tenaculum was placed laterally to stabilize the cervix and to straighten the endocervical canal. The laminaria was then coated with nitrofurazone ointment and placed in the endocervix with Milex laminaria forceps. The vagina was packed with three to four 3 x 3 gauze sponges, the first one being covered with approximately 2cc of nitrofurazone ointment. The patient was advised to call the clinic if she had severe cramps and was advised that she might have a yellowish discharge.

The following morning, the patient returned to the clinic approximately fifteen minutes before her scheduled procedure and was given 5-10 milligrams of Diazepam orally if indicated. Following a recording of her vital signs, the gauze and laminaria were removed under direct vision with sterile ring forceps and a repeat bimanual examination performed to re-ascertain uterine size and position. The vagina was prepped again with povidine-iodine solution and a wheal of approximately 5cc of 1% Lidocaine solution placed on the anterior or posterior cervical lip, depending on the direction of the uterine curve.

At this point, a side-curved Kelly cervical tenaculum (Allis tip) was placed at the site of the anesthesia wheal. A curved, rigid plastic uterine aspiration cannula of an appropriate size was then placed into the uterine cavity. If the uterine fundus was sounded with an early pregnancy, the cannula tip was then withdrawn 1-2 cm to reduce the risk of vacuum perforation of the uterine wall. The suction tubing was then connected. Upon reaching the maximum vacuum, the cannula tip was rotated to facilitate aspiration but not, as a rule, pushed in and out without completely withdrawing the cannula. If withdrawal was necessary to clear the cannula, the suction tubing was disconnected and re-connected with the cannula back in place within the uterine cavity. This permitted use of the blunt cannula as a sound. A slight in-and-out motion was applied, however, when a large placenta could be cleared by gentle tugging with the connected cannula.

Following emptying of the uterus by aspiration, the uterine cavity was explored with a ¼-curve Randall kidney stone forceps or a 1/8-curve fenestrated uterine dressing forceps depending on the amount of dilatation. This was followed by sharp curettage and re-aspiration if necessary. Oxytocics were administered parenterally as necessary.

The patient was then observed in an adjacent recovery room for at least one hour, given her postoperative instructions and a followup appointment for three weeks later. Antibiotics or other medications were not given postoperatively unless specifically indicated.

## **Results**

During the first fourteen months of clinic operation, 1406 abortion procedures were performed. Twelve of these were performed on previous patients. All but 38 (2.8%) were performed following cervical dilatation with laminaria. Reasons for manual dilatation included heavy bleeding following initial endocervical sounding (two cases), presumably due to the presence of placenta praevia, scheduling problems, or difficulty placing the laminaria.

The median age of the patients was 21 years, with 4.1% being under 17, 57.8% being between 17 and 22 years of age, and 0.4% being 40 years of age or over. Twenty-nine per cent of the patients were from the Boulderarea, 28.4% from the Denver metropolitan

area, 36.7% from the rest of Colorado, and 5.9% from neighboring states. Thirty-nine per cent of the patients had had previous pregnancies, and 18.1% had had previous abortions. 1.8% of the patients had already experienced two abortions, and .2% had had three or more. For 68 patients (4.8%), the current abortion was the second within one year.

About 40% of the patients were referred by public or private agencies such as Planned parenthood and health departments, 20.3% by private physicians, and the remainder by friends, former patients, or themselves as the result of initial publicity surrounding the clinic's opening. The overall followup rate, including letter and phone contact, was 80%, with 55% of patients seen in the clinic for a followup examination. Consistency of methods was enhanced by the fact that one physician (WMH) performed all but 3% of the procedures and provided nearly all followup care.

A final estimate of length of gestation indicated that over 65% of the pregnancies terminated were between 5 and 8 weeks duration, with about 10% being under 5 weeks, 18.1% from 9 to 10 weeks, and 4.6% 11 weeks or more. 1.1% of the procedures resulted in no evidence of pregnancy.

Of the 1368 procedures accomplished with the use of laminaria, 133 or 9.4% were accompanied by secondary manual dilatation with Pratt dilators. As an indication of the value of experience in reducing this proportion, it may be noted that 20 of these cases occurred in the first 102 procedures, and a substitute physician in ob-gyn residency training who performed 42 of the procedures had a manual dilatation rate of 28.5%. The remaining 1224 cases had a secondary dilatation rate of 8.3%.

The most common cause for manual dilatation was inadequate dilatation by the laminaria. In the early patients, however, it was primarily the result of uterine expulsion of the laminaria. This problem was remedied by adequate gauze packing. In some of the more advanced pregnancies, manual dilatation merely supplemented the basically adequate dilatation provided by the laminaria. This was felt to be desirable to allow greater ease and speed in completing the procedure.

Some maneuvers proved to be especially helpful in adequate placement of the laminaria. One was adequate sounding through the internal os, sometimes leaving the sound in place for a minute or two, then being sure that the terminal tip of the laminaria was through the internal os. Having an assistant put pressure on the uterine fundus by pressing downward behind the symphysis seemed to help straighten the endocervical canal in combination with cervical traction enough to allow passage of a very straight laminaria.

Another special problem was presented by the very early (4-5 week) pregnancy, particularly in the primigravida. Here, it frequently seemed desirable to have the patient return to the clinic early in the morning, dilate the cervix very slightly with the smallest Pratt dilator (#13 French), just enough to admit a "thin" laminaria. The patient was then instructed to return four hours later for her procedure. Supplemental manual dilatation was frequently necessary under these circumstances, but it was facilitated by the softening provided by the laminaria.

One very notable problem presented by the use of laminaria is the "dumbelling" or the development of differential expansion. This phenomenon can be very disconcerting, especially to the operator who is unfamiliar with its diagnosis and management. Sometimes the laminaria will expand more in the distal portion past the

internal os than at the level of the internal os itself. When this happens, the operator is unable to remove the laminaria. It is frequently associated with severe cramping during the night or during an attempt to remove it. If the patient calls and is instructed to remove it herself or have it removed by her husband or companion, she will probably be spared a more prolonged process of removal the next morning. The author has received reports of attempts to push the laminaria into the uterus upon discovery of this condition with resulting complications including perforation and hysterectomy. There has been at least one published report of a similar problem.<sup>9</sup> A maneuver which appears to be completely safe and effective in the management of this situation, however, is the application of a thorough paracervical block accompanied by gentle, steady traction with ring forceps. With a very difficult extraction, this can be assisted by grasping the laminaria at a point just below the internal os with a pair of curved uterine packing forceps. This was necessary in only one difficult case, but it proved to be invaluable. The “dumbelling” phenomenon (or “hourglass effect”, since it results in an hourglass-shaped laminaria) occurred 1.8% of the time in this series. One fourth of these 25 cases required additional manual dilatation. Since 64% of these cases of “dumbelling” occurred in pregnancies of 6 weeks’ gestation or less, it would appear that many very early cases might be best managed by a 4-5 hour laminaria placement rather than the overnight placement.

TABLE I Complications with  
laminaria

Immediate		
Hemorrhage, post-laminaria		1
Atony, operative, with hemorrhage (up to 250cc blood loss)		6
Atony, postoperative (within 4 hours)		2
Laminaria removed due to pain		5
Anesthesia reaction		1
Septicemia, gram negative (one hour post-op)		1
Retained tissue		1
Convulsion		1
False passage of laminaria		<u>1</u>
		19
Delayed (within 4 weeks after procedure)		
Fever (102° or less, less than 1 day)		58
Endometritis/parametritis		11
Treated with antibiotics (above two categories)	(18)	
Severe cramps		14
Superficial thrombophlebitis		1
Retained tissue		1
Depressive reaction		4
Combined (bleeding, cramping)		6
Cystitis		1

:Late (more than 4 weeks after procedure)  
Pelvic abscess

1

Total Complications = 116/1406 = 8.3%

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One critical aspect to the “dumbelling” phenomenon is the sturdiness of the laminaria material itself. It is obvious that a laminaria that disintegrates under the kind of traction necessary to remove one which has “dumbelled” is unsatisfactory and dangerous. Of the 1368 procedures performed with laminaria, all but three were accomplished with Milex® laminaria, and in one of these, the string at the proximal end pulled through, but the laminaria was removed under paracervical block with relative ease. A quantity of Eschmann® laminaria (*Laminaria digitata*) was obtained for use upon recommendation by a colleague, but they were generally found to be too large for first-trimester pregnancy. Three were placed in one afternoon session. Two “dumbelled” and both disintegrated the following morning with traction, requiring a long and tedious process of removal with no adverse consequences.

Blood loss was generally minimal. Eighty-five per cent of the procedures resulted in approximately 20-30 cc blood loss, and 905% of the procedures caused 50cc or less blood loss. In seventeen procedures there was over 100cc blood lost (1.6%), with six procedures (0.4%) being accompanied by as much as 250cc blood loss. These results may be compared to those obtained by Niswander.<sup>10</sup>

The overall complication rate, 8.2%, is similar to the 8.0% rate described in 1972 by Newton, but contains more categories.<sup>11</sup> The complications are listed in Table 1. They include the minor complaints of postabortion bleeding and cramping which was more than a normal menstrual period. They also include five cases of excessive bleeding during the procedure, one case of overnight post-laminaria bleeding requiring immediate attention and completion of the procedure, and four cases in which severe cramping required home self-removal of the laminaria. It includes one case of tubo-ovarian abscess requiring laparotomy which occurred some seven weeks after the abortion and nearly four weeks after a completely normal followup examination. There is no conclusive evidence to date which clearly relates this latter development to the abortion or, for that matter, suggests any other cause. The complications also include two cases of postabortal uterine atony (0.2%), which may be compared to the 0.88% reported by Sands and Burnhill.<sup>12</sup> There were no uterine perforations, cervical lacerations, or continued pregnancies.

The most significant set of complications were those related to infection or fever. One patient developed chills and fever of 102° approximately one hour after her abortion as she was preparing to leave the clinic. Blood cultures were taken, and these and endocervical and uterine cultures grew out E.Coli. Re-aspiration revealed a few small clots. Prompt antibiotic therapy resulted in a remission of symptoms and there were not further complications. Of all patients, 5.5% developed fevers, almost all less than 102° and of a transitory nature. Eighteen patients either presented themselves for treatment during or within 12 hours after the febrile episode and were treated with Doxycycline 100

mgm b.i.d. (1.2%). Eleven patients (0.8%) were diagnosed as having endometritis or parametritis.

There were five patients who were known to have been hospitalized. One was hospitalized with heat stroke following a raft trip taken a few days after the abortion, contrary to postoperative instructions. Another was hospitalized because of anxiety in both the patient and the clinic physician during the second week of clinic operation after the patient reported an episode of heavy bleeding and passage of clots; her overnight hospital stay and subsequent course was entirely uneventful. A third reported bleeding and cramping approximately one week after her procedure, was seen at a hospital in her locality where she was re-aspirated and found to have a small quantity of intrauterine clots. A fourth was treated for endometritis by a colleague in a neighboring state on the third postoperative day, and the fifth was the patient who developed a tubo-ovarian abscess some seven weeks after the abortion.

### ***Discussion***

During the first fourteen months of clinic operation, the use of laminaria proved to be a highly acceptable component of treatment in the termination of first-trimester pregnancy. One day in which all patients had manual dilatation, because of scheduling difficulties, was enough to convince the entire clinic staff, all of whom had had ample previous experience in clinics where manual dilatation was standard, of the value of the laminaria technic. Basically, it seems not only much easier on the patients but also on the operating physician.

The principal disadvantages include the necessity for two clinic visits, the risk of mild to severe overnight cramping (seen to some extent in perhaps 1/3 of all patients), expense (Milex laminaria cost \$2.75 each), and occasional anxiety about whether the patient is responsible enough to return the following day. This latter possibility was never a serious problem, however. Initially, we were concerned that patients would experience an increase in anxiety during the overnight wait. However, in the vast majority of patients, the opposite tended to be true.

The medical advantages have appeared to be significant. Most importantly, the use of laminaria offers a safe, physiologic, atraumatic method of cervical dilatation. There is a reduced need for local anesthesia and a decreased likelihood of serious anesthetic reaction. There is a reduced risk of uterine perforation and cervical laceration due to the lessened need for forceful dilatation. The procedure time is rapid, and blood loss is usually insignificant if not non-existent. Finally, it allows some careful preoperative evaluation of the patient's emotional status, her reaction to the pregnancy and abortion, and her response to pain prior to the actual procedure. The complication rate seems comparable to or better than those seen in other series.<sup>13-15</sup>

### ***Summary***

The use of laminaria for cervical dilatation has gained recent acceptance in the United States for use in first-trimester abortions. Since 1973 in a community abortion clinic in Boulder, Colorado, laminaria has been used almost exclusively for cervical dilatation. During the first 14 months of clinic operation, over 1400 first-trimester abortion procedures were performed. Laminaria was used in 1368 of these. There were no uterine perforations or cervical lacerations, primarily because the technic markedly

reduced the need for forceful manual dilatation. The chance of anesthetic reaction is lessened because of the reduced need for local anesthetic. There has been only one major complication. ●

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#### DRUGS MENTIONED IN TEXT

Diazepam (Valium)	Laminaria japonicum (Milex)
Povidine-iodine solution (Betadine)	Laminaria digitata (Eschmann)
Nitrofurazone (furacin) soluble dressing (Vibramycin)	Doxycycline hyclate
Lidocaine (Xylocaine)	

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