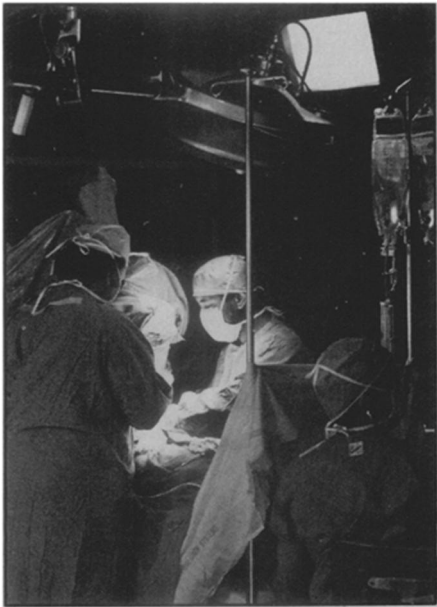


Lasers Versus Female Complaints



Laser surgical techniques now promise increased benefits in gynecology

BY DIETRICK E. THOMSEN

erficial cancer that sometimes develops from the dysplastic lesions.

Dysplasia is not a rare disease. Bellina says it is reaching epidemic proportions in the United States, not to mention other parts of the world. Furthermore, the age of onset has been dropping. Years ago dysplasia was seen usually in mature women, women in their thirties and older. Now the average age of incidence is in the 14- to 25-year range, Bellina says, and pushing toward the pre-teen years. The carcinoma that may develop from it is not far behind: Bellina says the earliest carcinoma *in situ* in his experience was in a 14-year-old. "And I've had a 21-year-old already dead from it," he adds.

Not all appearances of dysplasia — which is sometimes called precancerous tissue — develop into malignancies. The figure is about 30 percent. The rest tend to regress and disappear. "But we don't have a good model to tell us which will and which won't," says Bellina.

So the obvious therapeutic procedure is to get rid of it all, to destroy the dysplastic cells thoroughly enough to prevent recurrences.

At the beginning of the 1970s cryosurgery was applied, but there

seemed to be a hazard: the survival of a certain amount of the DNA of the dysplastic cells, which could then serve to trigger a recurrence. Lasers were brought in to see if they could do better.

One question was how deep the killing of cells and destruction of DNA had to go. The textbooks said 3 millimeters deep. Cryosurgery had gone that deep, but apparently something underneath had escaped. Textbooks to the contrary, Bellina says, "Nobody had ever sat down and measured this." The laser surgeons tried at first to develop some range finding indicators, but the effort proved costly, and the patients' heartbeats were confusing the issue because they gave the tissue pulsations with a 2-millimeter amplitude.

The researchers decided to do the job clinically, starting very shallow and going deeper and deeper till they reached a point of optimum benefit. At 3 millimeters they had a 16 percent recurrence rate. They decided, Bellina says, "We'll go wider and just go deeper." The depth went to 4, 4.5, 5 even to 7 millimeters. Below 5 millimeters they got the recurrence rate down to 4.4 percent. As of today, in 1,500 cases that they have followed for some time, there is a recurrence rate of about 5 percent.

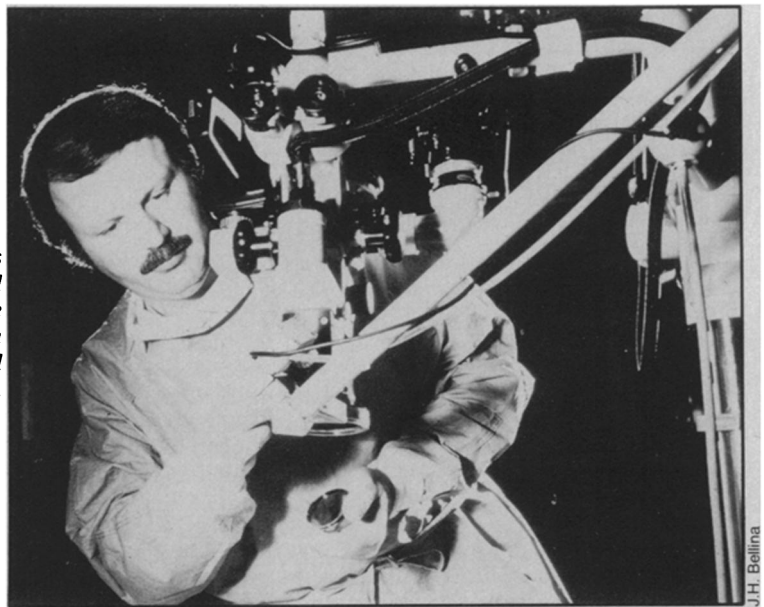
Where there is carcinoma *in situ*, the laser technique is to try to destroy all of the tumor. The way this is done, the way the laser heat transfer vaporizes the cells and destroys the chemical bonds in their DNA and RNA material, seems particularly effective in destroying the malignancy and preventing recurrence. As an example, the 14-year-old girl mentioned above, who caught the disease from her mother, has now been followed for two years without a recurrence.

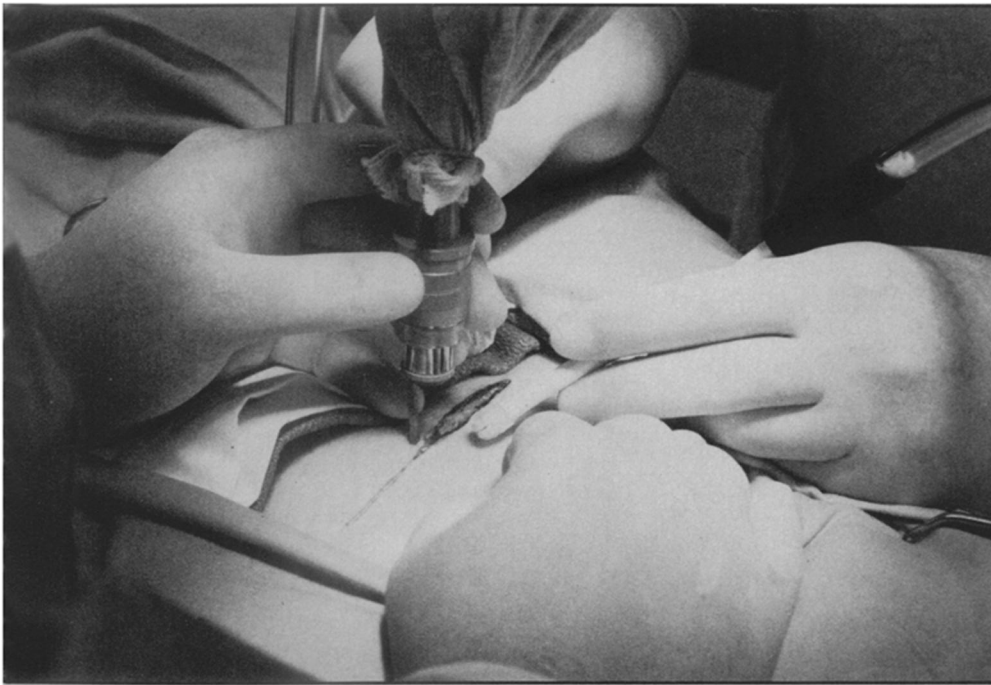
People who think of lasers in surgery are likely to think first of eye surgery. It was in that department of surgery that lasers were first employed, and in which over the years they have received a good deal of publicity. Gynecology is reputed to be one of the largest medical specialties. Whatever may be the comparative statistics between gynecological surgery and ocular surgery, it is certain that the world's hospitals see a good number of gynecological operations in a year. Thus, the extension of laser techniques to gynecological treatments, which has begun in the last couple of years, promises to add greatly to the number of those who benefit from the laser's surgical capabilities.

Among those benefits, according to J.H. Bellina of Louisiana State University School of Medicine, who was invited to review progress in the field at the recent Lasers '80 Conference in New Orleans, is a higher probability of eradication of pre-malignant and malignant conditions and the maintenance or restoration of fertility in cases where other techniques could not. The instrument generally used for this work, he says, is the so-called AO 100, which uses articulated mirrors to deliver a spot of laser light to the point where the surgeon wants it. This system has gotten smaller over the years since 1974, Bellina says, both in gross physical size — its electrical housing was once six feet across — and in the size of the spot of laser light it delivers, which can now be as small as 125 micrometers under certain conditions.

One purpose of these tiny pinpoints of light is to destroy the abnormal growths in the lining of the cervix, known as dysplastic cells, and the carcinoma *in situ* or sup-

Bellina aligns the optical system of the laser used in gynecological surgery.





Laser used in freehand fashion for abdominal incision at beginning of surgery.

Presumably this girl got the disease at birth while passing through her mother's diseased birth canal. It seems that viruses are implicated in the triggering of dysplasia—they are believed responsible for altering the DNA so as to trigger the growth of aberrant cells. One of the reasons the disease is showing up in younger women, Bellina believes, is that they tend to have a larger variety of sexual partners than older women were likely to have had. It is not uncommon, he says, to find people who have had in excess of 50. There are thousands of species of the virus in question, and the more species a woman is exposed to, the more risk she runs. In addition to the variety, Bellina suggests that around the end of the Vietnam war there was a mutation of these viruses that made many of them rougher and contributed to

the virulence of the present "epidemic."

Since younger women are affected more than they used to be, women at the beginning rather than near the end of their reproductive life, it is very gratifying that these laser techniques can often spare a uterus that otherwise might have had to be excised, thus preserving the woman's reproductive capacity. Bellina cites the extreme case of a 15- or 16-year-old girl so affected that her uterus and vagina were lined with dysplasia, and it even appeared externally. "How do you tell her that you have to cut out everything and that she can never have children because of something that happened to her when she was 16? We had no good answer for young females. Today we have a good answer."

Loss of fertility can also result from obstruction of the fallopian tubes. This

may be deliberate, the surgical tying of the tubes as a form of birth control. Or it may be the result of disease or injury. Venereal disease is one of the chief causes of fallopian tube blockage. Bellina estimates that there are 150,000-plus new cases of VD among women each year. Injury can also be caused by objects inserted into the uterus: Intrauterine birth control devices make a contribution, too.

Bellina showed a slide of a fallopian tube "filled with pus." In 1974 a condition like this would have led a reasonably conservative gynecologist to recommend a hysterectomy, he says. Bellina and his co-workers set out "to reconstruct her pelvic anatomy."

Their first advantage was the precision with which the laser can cut and reconnect these tiny anatomical structures, but the real bonus is the way the laser cuts heal. Bellina calls this "embryological." That is, it imitates the way an embryo produces new tissue, rather than the way adult wounds heal with the production of collagen and scar tissue. If you use the laser right, he says, it doesn't scar. Formation of scars after cutting by other microsurgical techniques could destroy the benefit of the operation. Furthermore, with the laser the operation goes faster. The laser version took two hours, where conventional microsurgical techniques would have taken six to eight. The difference is that laser cutting seals off small blood vessels as it goes. (Larger bleeders have to be tied and reconnected in the conventional way.)

Since the operation, this patient has had a child. "It would not have been possible without the CO₂ laser," Bellina says.

New laser systems are now being developed to give the surgeon greater working range and flexibility and to deliver higher power densities. It is even becoming possible to treat a lesion that cannot be directly seen by using a mirror to direct the laser beam.

These developments promise new ways of treating endometriosis, "the plague of young females," as Bellina calls it. In this disease, endometrial cells, which normally line the inside of the uterus, proliferate where they ought not to be. Treating such lesions can mean working in hard to reach areas and under very close tolerances to avoid damaging other tissue. The laser's precision can make it possible.

If you know what you're doing with a laser you can do some very finely cut things. The Japanese, says Bellina, do some magnificent work in ciliar reconstitution. If you don't do it right, the operation can fail. It is especially necessary for doctors to understand the biophysics involved, he says. There are now about 375 gynecological surgeons trained in laser techniques, Bellina estimates, and more keep coming to training sessions. He expects that in three to five years the laser will work a revolution in gynecology. □



Bellina uses a video recorder to film a laparoscopic procedure done to determine whether a patient is a candidate for surgery.

Photos: V.L. Bewig Jr.