WEBVTT

NOTE duration:"00:50:22.6500000"

NOTE recognizability:0.858

NOTE language:en-us

NOTE Confidence: 0.9463802925

00:00:00.000 --> 00:00:02.175 Good afternoon, everybody.

NOTE Confidence: 0.9463802925

00:00:02.175 --> 00:00:05.800 Thank you all for coming.

NOTE Confidence: 0.9463802925

00:00:05.800 --> 00:00:09.892 It's my really true pleasure to

NOTE Confidence: 0.9463802925

00:00:09.892 --> 00:00:12.620 introduce Sherry Dimas today.

NOTE Confidence: 0.9463802925

00:00:12.620 --> 00:00:18.228 Sherry is a world's expert on treatment

NOTE Confidence: 0.9463802925

00:00:18.228 --> 00:00:22.206 of gynecologic malignancies and you know.

NOTE Confidence: 0.9463802925

00:00:22.206 --> 00:00:24.566 We I'm not just throwing

NOTE Confidence: 0.9463802925

00:00:24.566 --> 00:00:26.869 that those words around.

NOTE Confidence: 0.9463802925

00:00:26.870 --> 00:00:29.350 She really is a leader,

NOTE Confidence: 0.9463802925

00:00:29.350 --> 00:00:31.858 and we're so lucky to have

NOTE Confidence: 0.9463802925

00:00:31.858 --> 00:00:34.700 her here at Yale University.

NOTE Confidence: 0.9463802925

00:00:34.700 --> 00:00:37.868 Sherry trained at Cornell and then

NOTE Confidence: 0.9463802925

00:00:37.868 --> 00:00:41.304 did her residency at Memorial Sloan

NOTE Confidence: 0.9463802925

00:00:41.304 --> 00:00:45.678 Kettering and joined us 11 years ago.

NOTE Confidence: 0.9463802925

00:00:45.678 --> 00:00:49.554 She's now professor of therapeutic radiology,

NOTE Confidence: 0.9463802925

00:00:49.560 --> 00:00:50.990 and she.

NOTE Confidence: 0.9463802925

00:00:50.990 --> 00:00:54.565 It built our HDR brachytherapy

NOTE Confidence: 0.9463802925

00:00:54.565 --> 00:00:57.490 service here at Yale,

NOTE Confidence: 0.9463802925

00:00:57.490 --> 00:01:00.370 which is really an incredible accomplishment.

NOTE Confidence: 0.9463802925

00:01:00.370 --> 00:01:02.449 So today she's going to be speaking

NOTE Confidence: 0.9463802925

00:01:02.449 --> 00:01:05.087 to us about advances in treatment of

NOTE Confidence: 0.9463802925

00:01:05.087 --> 00:01:07.778 cervical cancer and welcome Sherry.

NOTE Confidence: 0.935895566

00:01:19.990 --> 00:01:21.090 Thank you so much, Joe,

NOTE Confidence: 0.935895566

00:01:21.090 --> 00:01:22.776 for that very kind introduction and

NOTE Confidence: 0.935895566

00:01:22.776 --> 00:01:24.509 it's really an honor to be here.

NOTE Confidence: 0.935895566

00:01:24.510 --> 00:01:27.289 So as you heard, I direct the

NOTE Confidence: 0.935895566

00:01:27.289 --> 00:01:28.826 gynecologic radiotherapy program here

NOTE Confidence: 0.935895566

00:01:28.826 --> 00:01:31.042 at Yale and today I'm going to be.

NOTE Confidence: 0.935895566

00:01:31.050 --> 00:01:32.410 Talking about brachytherapy and

NOTE Confidence: 0.935895566

00:01:32.410 --> 00:01:34.110 the treatment of cervical cancer,

NOTE Confidence: 0.935895566

00:01:34.110 --> 00:01:36.186 how we approach these patients and

NOTE Confidence: 0.935895566

00:01:36.186 --> 00:01:37.906 specifically the supportive and innovative

NOTE Confidence: 0.935895566

00:01:37.906 --> 00:01:39.887 programs that we have here at Yale

NOTE Confidence: 0.935895566

00:01:39.887 --> 00:01:41.869 for this unique patient population.

NOTE Confidence: 0.935895566

00:01:41.870 --> 00:01:44.798 And they have no financial disclosures.

NOTE Confidence: 0.935895566

00:01:44.800 --> 00:01:46.415 So cervical cancer is a

NOTE Confidence: 0.935895566

00:01:46.415 --> 00:01:47.384 global health problem.

NOTE Confidence: 0.935895566

00:01:47.390 --> 00:01:47.758 Worldwide,

NOTE Confidence: 0.935895566

00:01:47.758 --> 00:01:50.334 there's more than 600,000 new cases per

NOTE Confidence: 0.935895566

00:01:50.334 --> 00:01:53.116 year and more than 340,000 deaths in 2020.

NOTE Confidence: 0.935895566

00:01:53.116 --> 00:01:55.240 And it's particularly a problem in

NOTE Confidence: 0.935895566

00:01:55.309 --> 00:01:57.114 resource limited countries where it's

NOTE Confidence: 0.935895566

00:01:57.114 --> 00:02:00.018 a very common type of cancer and a

NOTE Confidence: 0.935895566

00:02:00.018 --> 00:02:02.094 very common cause of cancer mortality.

NOTE Confidence: 0.935895566

00:02:02.100 --> 00:02:03.615 And in certain regions of

NOTE Confidence: 0.935895566

00:02:03.615 --> 00:02:04.827 Africa and Central America,

NOTE Confidence: 0.935895566

00:02:04.830 --> 00:02:06.485 it's actually the leading cause

NOTE Confidence: 0.935895566

00:02:06.485 --> 00:02:07.809 of cancer related mortality.

NOTE Confidence: 0.935895566

00:02:07.810 --> 00:02:10.288 And unfortunately this is a cancer

NOTE Confidence: 0.935895566

00:02:10.288 --> 00:02:11.527 that disproportionately effects

NOTE Confidence: 0.935895566

00:02:11.527 --> 00:02:13.473 women in low socioeconomic groups

NOTE Confidence: 0.935895566

00:02:13.473 --> 00:02:15.308 and there are complex challenges

NOTE Confidence: 0.935895566

00:02:15.308 --> 00:02:17.774 for these women at every step in

NOTE Confidence: 0.935895566

00:02:17.774 --> 00:02:19.130 the cervical cancer continuum.

NOTE Confidence: 0.935895566

00:02:19.130 --> 00:02:20.386 In the United States,

NOTE Confidence: 0.935895566

00:02:20.386 --> 00:02:21.956 there's more than 14,000 new

NOTE Confidence: 0.935895566

00:02:21.956 --> 00:02:23.759 cases per year and more than

NOTE Confidence: 0.935895566

00:02:23.759 --> 00:02:25.265 4000 deaths expected in 2022.

NOTE Confidence: 0.935895566

00:02:25.265 --> 00:02:27.750 The highest incidence is among US Hispanic,

NOTE Confidence: 0.935895566

00:02:27.750 --> 00:02:29.890 black and Native American populations.

NOTE Confidence: 0.935895566

00:02:29.890 --> 00:02:31.549 This is a cancer of young women.

NOTE Confidence: 0.935895566

00:02:31.550 --> 00:02:33.670 It is most frequently diagnosed

NOTE Confidence: 0.935895566

00:02:33.670 --> 00:02:36.130 in women ages 35 to 44.

NOTE Confidence: 0.935895566

00:02:36.130 --> 00:02:37.480 And as we all know,

NOTE Confidence: 0.935895566

00:02:37.480 --> 00:02:39.244 HPV is central to the development

NOTE Confidence: 0.935895566

00:02:39.244 --> 00:02:40.126 of cervical cancer.

NOTE Confidence: 0.935895566

00:02:40.130 --> 00:02:42.436 It causes more than 95% of cases.

NOTE Confidence: 0.935895566

00:02:42.436 --> 00:02:43.968 Risk factors include various

NOTE Confidence: 0.935895566

00:02:43.968 --> 00:02:45.242 sexual behaviors, including young,

NOTE Confidence: 0.935895566

00:02:45.242 --> 00:02:46.246 age at first coitus,

NOTE Confidence: 0.935895566

00:02:46.250 --> 00:02:48.528 multiple sexual partners, history of STI's.

NOTE Confidence: 0.935895566

00:02:48.528 --> 00:02:50.856 It's also more common among those

NOTE Confidence: 0.935895566

00:02:50.856 --> 00:02:53.009 with a compromised immune system.

NOTE Confidence: 0.935895566

00:02:53.010 --> 00:02:53.808 So fortunately,

NOTE Confidence: 0.935895566

00:02:53.808 --> 00:02:55.404 screening cervical cytology and

NOTE Confidence: 0.935895566

00:02:55.404 --> 00:02:57.919 HPV testing has led to reductions

NOTE Confidence: 0.935895566

00:02:57.919 --> 00:02:59.627 in cervical cancer mortality,

NOTE Confidence: 0.935895566

00:02:59.630 --> 00:03:02.070 particularly in resource rich settings.

NOTE Confidence: 0.935895566

00:03:02.070 --> 00:03:03.744 And the incidence of cervical cancer

NOTE Confidence: 0.935895566

00:03:03.744 --> 00:03:05.195 is affected both by epidemiologic

NOTE Confidence: 0.935895566

00:03:05.195 --> 00:03:07.183 risk factors as well as by having

NOTE Confidence: 0.935895566

00:03:07.183 --> 00:03:08.749 access to screening programs.

NOTE Confidence: 0.935895566

00:03:08.750 --> 00:03:11.138 So for those who are screened,

NOTE Confidence: 0.935895566

00:03:11.140 --> 00:03:13.135 cervical cancer may be discovered

NOTE Confidence: 0.935895566

00:03:13.135 --> 00:03:15.130 asymptomatically and very early stages,

NOTE Confidence: 0.935895566

00:03:15.130 --> 00:03:16.930 for example because of an abnormal

NOTE Confidence: 0.935895566

00:03:16.930 --> 00:03:19.558 pap smear or if you know a visible

NOTE Confidence: 0.935895566

00:03:19.558 --> 00:03:20.926 lesion is discovered incidentally

NOTE Confidence: 0.935895566

00:03:20.926 --> 00:03:22.810 on a pelvic examination.

NOTE Confidence: 0.935895566

00:03:22.810 --> 00:03:23.908 But these are not the patients

NOTE Confidence: 0.935895566

00:03:23.908 --> 00:03:25.189 that I see in my practice.

NOTE Confidence: 0.857700482142857

00:03:27.520 --> 00:03:29.160 So the types of patients that I might

NOTE Confidence: 0.857700482142857

00:03:29.160 --> 00:03:30.840 see in my practice are typically,

NOTE Confidence: 0.857700482142857

00:03:30.840 --> 00:03:32.310 let's say, a young woman in her

NOTE Confidence: 0.857700482142857

00:03:32.310 --> 00:03:34.584 30s or 40s who has a very advanced

NOTE Confidence: 0.857700482142857

00:03:34.584 --> 00:03:35.852 cancer that's highly symptomatic.

NOTE Confidence: 0.857700482142857

00:03:35.860 --> 00:03:37.150 And she's probably had bleeding

NOTE Confidence: 0.857700482142857

00:03:37.150 --> 00:03:38.979 and pain going on for some time.

NOTE Confidence: 0.857700482142857

00:03:38.980 --> 00:03:40.412 She's perhaps bounced around

NOTE Confidence: 0.857700482142857

00:03:40.412 --> 00:03:41.486 between different emergency

NOTE Confidence: 0.857700482142857

00:03:41.486 --> 00:03:43.040 departments and different hospitals,

NOTE Confidence: 0.857700482142857

00:03:43.040 --> 00:03:45.420 misdiagnosed with fibroids or infection,

NOTE Confidence: 0.857700482142857

00:03:45.420 --> 00:03:47.120 and she's often from an

NOTE Confidence: 0.857700482142857

00:03:47.120 --> 00:03:47.800 underserved community.

NOTE Confidence: 0.857700482142857

00:03:47.800 --> 00:03:49.534 She is often suspicious of the

NOTE Confidence: 0.857700482142857

00:03:49.534 --> 00:03:51.414 medical student of the medical system

NOTE Confidence: 0.857700482142857

00:03:51.414 --> 00:03:53.418 and has not had routine screening.

NOTE Confidence: 0.857700482142857

00:03:53.420 --> 00:03:55.976 She may even be suspicious of a GYN exam,

NOTE Confidence: 0.857700482142857

00:03:55.980 --> 00:03:57.522 perhaps a history of abuse or

NOTE Confidence: 0.857700482142857

00:03:57.522 --> 00:03:59.204 trauma in her past and often

NOTE Confidence: 0.857700482142857

00:03:59.204 --> 00:04:00.694 life hasn't treated her well,

NOTE Confidence: 0.857700482142857

00:04:00.700 --> 00:04:03.076 and now she's hit with this.

NOTE Confidence: 0.857700482142857

00:04:03.080 --> 00:04:04.460 What do I mean by this?

NOTE Confidence: 0.857700482142857

00:04:04.460 --> 00:04:06.518 So this is locally advanced cervical cancer.

NOTE Confidence: 0.857700482142857

00:04:06.520 --> 00:04:08.832 That's when the tumor has grown to be

NOTE Confidence: 0.857700482142857

00:04:08.832 --> 00:04:10.697 clinically visible more than 4 centimeters.

NOTE Confidence: 0.857700482142857

00:04:10.700 --> 00:04:12.620 It invades beyond the cervix

NOTE Confidence: 0.857700482142857

00:04:12.620 --> 00:04:14.156 into the parametrial tissues.

NOTE Confidence: 0.857700482142857

00:04:14.160 --> 00:04:16.120 It can extend out to the pelvic sidewall,

NOTE Confidence: 0.857700482142857

00:04:16.120 --> 00:04:17.492 down into the vagina,

NOTE Confidence: 0.857700482142857

00:04:17.492 --> 00:04:19.550 can also extend into the surrounding

NOTE Confidence: 0.857700482142857

00:04:19.609 --> 00:04:21.184 structures of the pelvis,

NOTE Confidence: 0.857700482142857

00:04:21.184 --> 00:04:23.152 including the bladder or the ******.

NOTE Confidence: 0.857700482142857

00:04:23.160 --> 00:04:24.320 And for these patients,

NOTE Confidence: 0.857700482142857

00:04:24.320 --> 00:04:26.060 the primary treatment is not surgery,

NOTE Confidence: 0.857700482142857

00:04:26.060 --> 00:04:27.100 but rather these patients

NOTE Confidence: 0.857700482142857

00:04:27.100 --> 00:04:28.140 are treated with chemo,

NOTE Confidence: 0.857700482142857

00:04:28.140 --> 00:04:29.379 radiation and brachytherapy.

NOTE Confidence: 0.85642898047619

00:04:31.970 --> 00:04:33.692 The paradigm for treatment is shown here

NOTE Confidence: 0.85642898047619

00:04:33.692 --> 00:04:35.432 and what I'm showing on the horizontal

NOTE Confidence: 0.85642898047619

00:04:35.432 --> 00:04:37.370 line is the time frame of treatment.

NOTE Confidence: 0.85642898047619

00:04:37.370 --> 00:04:38.650 So we try to get all of the

NOTE Confidence: 0.85642898047619

00:04:38.650 --> 00:04:39.719 treatments done within eight weeks.

NOTE Confidence: 0.85642898047619

00:04:39.720 --> 00:04:41.085 So for the first five to six

NOTE Confidence: 0.85642898047619

00:04:41.085 --> 00:04:42.206 weeks of treatment, the treatment

NOTE Confidence: 0.85642898047619

00:04:42.206 --> 00:04:43.546 consists of external beam radiation,

NOTE Confidence: 0.85642898047619

00:04:43.550 --> 00:04:45.014 which is what I'm going to show you.

NOTE Confidence: 0.85642898047619

00:04:45.020 --> 00:04:46.925 These arrows can note weekly

NOTE Confidence: 0.85642898047619

00:04:46.925 --> 00:04:47.687 cisplatinum chemotherapy,

NOTE Confidence: 0.85642898047619

00:04:47.690 --> 00:04:49.250 which has been shown in randomized

NOTE Confidence: 0.85642898047619

00:04:49.250 --> 00:04:50.968 trials to to improve the overall

NOTE Confidence: 0.85642898047619

00:04:50.968 --> 00:04:52.228 survival in this population.

NOTE Confidence: 0.85642898047619

00:04:52.230 --> 00:04:53.838 So the first five to six

NOTE Confidence: 0.85642898047619

00:04:53.838 --> 00:04:54.910 weeks are chemo radiation.

NOTE Confidence: 0.85642898047619

00:04:54.910 --> 00:04:56.400 That is followed by brachytherapy,

NOTE Confidence: 0.85642898047619

00:04:56.400 --> 00:04:57.870 which I'm going to talk about today.

NOTE Confidence: 0.85642898047619

00:04:57.870 --> 00:04:58.386 And again,

NOTE Confidence: 0.85642898047619

00:04:58.386 --> 00:04:59.676 all these treatments we tried

NOTE Confidence: 0.85642898047619

00:04:59.676 --> 00:05:01.029 to complete within eight weeks,

NOTE Confidence: 0.85642898047619

00:05:01.030 --> 00:05:02.122 studies have shown that.

NOTE Confidence: 0.85642898047619

00:05:02.122 --> 00:05:03.487 Sending treatment beyond eight weeks

NOTE Confidence: 0.85642898047619

00:05:03.487 --> 00:05:05.171 is associated with a reduction in

NOTE Confidence: 0.85642898047619

00:05:05.171 --> 00:05:06.536 tumor control and worse outcomes.

NOTE Confidence: 0.900395265

00:05:08.770 --> 00:05:10.482 I think many of you here are familiar

NOTE Confidence: 0.900395265

00:05:10.482 --> 00:05:11.589 with external beam radiation,

NOTE Confidence: 0.900395265

00:05:11.590 --> 00:05:12.523 also called evart.

NOTE Confidence: 0.900395265

00:05:12.523 --> 00:05:14.700 The patient comes every day to our

NOTE Confidence: 0.900395265

00:05:14.767 --> 00:05:16.645 department for five days a week.

NOTE Confidence: 0.900395265

00:05:16.650 --> 00:05:18.092 For five weeks she lies on a

NOTE Confidence: 0.900395265

00:05:18.092 --> 00:05:19.219 table that looks like this.

NOTE Confidence: 0.900395265

00:05:19.220 --> 00:05:21.062 This is called a linear accelerator

NOTE Confidence: 0.900395265

00:05:21.062 --> 00:05:22.964 that delivers high energy X-rays from

NOTE Confidence: 0.900395265

00:05:22.964 --> 00:05:24.806 the outside into a very carefully

NOTE Confidence: 0.900395265

00:05:24.806 --> 00:05:26.639 designed target like what you see here.

NOTE Confidence: 0.900395265

00:05:26.640 --> 00:05:28.386 And this is a target that's

NOTE Confidence: 0.900395265

00:05:28.386 --> 00:05:29.960 designed to incorporate the pelvic

NOTE Confidence: 0.900395265

00:05:29.960 --> 00:05:31.360 tissues that are involved,

NOTE Confidence: 0.900395265

00:05:31.360 --> 00:05:32.345 any lymph nodes that are

NOTE Confidence: 0.900395265

00:05:32.345 --> 00:05:33.133 involved in the pelvis,

NOTE Confidence: 0.900395265

00:05:33.140 --> 00:05:34.316 as well as the periaortic region,

NOTE Confidence: 0.900395265

00:05:34.320 --> 00:05:35.874 which is a common area that's

NOTE Confidence: 0.900395265

00:05:35.874 --> 00:05:36.910 involved with cervical cancer.

NOTE Confidence: 0.728713545454546

00:05:39.060 --> 00:05:40.236 And specifically with MRT,

NOTE Confidence: 0.728713545454546

00:05:40.236 --> 00:05:42.320 like in the plan that's shown here,

NOTE Confidence: 0.728713545454546

00:05:42.320 --> 00:05:44.210 we're able to deliver a very carefully

NOTE Confidence: 0.728713545454546

00:05:44.210 --> 00:05:45.743 designed field to the areas that

NOTE Confidence: 0.728713545454546

00:05:45.743 --> 00:05:47.297 are at risk and give much lower

NOTE Confidence: 0.728713545454546

00:05:47.350 --> 00:05:48.946 dose to any of the surrounding

NOTE Confidence: 0.728713545454546

00:05:48.946 --> 00:05:50.268 structures in the pelvis through

NOTE Confidence: 0.728713545454546

00:05:50.268 --> 00:05:51.558 a very carefully modulated beam.

NOTE Confidence: 0.728713545454546

00:05:51.560 --> 00:05:53.390 Again, we're avoiding the bowel,

NOTE Confidence: 0.728713545454546

00:05:53.390 --> 00:05:55.623 the, the spine, the kidneys, the,

NOTE Confidence: 0.728713545454546

00:05:55.623 --> 00:05:57.604 you know, the bone and the muscle.

NOTE Confidence: 0.728713545454546

00:05:57.610 --> 00:05:59.194 So we're able to deliver this

NOTE Confidence: 0.728713545454546

00:05:59.194 --> 00:06:00.844 type of treatment with much less

NOTE Confidence: 0.728713545454546

00:06:00.844 --> 00:06:02.446 toxicity than in the olden days.

NOTE Confidence: 0.728713545454546

00:06:02.450 --> 00:06:04.310 Another advantage of IRT using the

NOTE Confidence: 0.728713545454546

00:06:04.310 --> 00:06:06.098 modulated beams is we're able to

NOTE Confidence: 0.728713545454546

00:06:06.098 --> 00:06:07.827 deliver a high dose to the pelvic

NOTE Confidence: 0.728713545454546

00:06:07.827 --> 00:06:09.597 lymph node regions and deliver a

NOTE Confidence: 0.728713545454546

00:06:09.597 --> 00:06:11.301 dose of approximately 60 Gray while

NOTE Confidence: 0.728713545454546

00:06:11.301 --> 00:06:12.456 giving simultaneously a much lower

NOTE Confidence: 0.728713545454546

00:06:12.456 --> 00:06:13.955 dose to any of the surrounding

NOTE Confidence: 0.728713545454546

00:06:13.955 --> 00:06:15.019 tissues in the pelvis.

NOTE Confidence: 0.883967432

00:06:17.320 --> 00:06:18.468 But for cervical cancer,

NOTE Confidence: 0.883967432

00:06:18.468 --> 00:06:20.190 what's unique is that external beam

NOTE Confidence: 0.883967432

00:06:20.243 --> 00:06:21.678 radiation alone is not enough.

NOTE Confidence: 0.883967432

00:06:21.680 --> 00:06:23.135 The second-half of their treatment

NOTE Confidence: 0.883967432

00:06:23.135 --> 00:06:24.299 is delivered with brachytherapy,

NOTE Confidence: 0.883967432

00:06:24.300 --> 00:06:25.672 also called internal radiation,

NOTE Confidence: 0.883967432

00:06:25.672 --> 00:06:28.112 where we have to deliver a much

NOTE Confidence: 0.883967432

00:06:28.112 --> 00:06:30.038 higher dose to the central tumor,

NOTE Confidence: 0.883967432

00:06:30.040 --> 00:06:31.839 really a dose of about 90 Gray.

NOTE Confidence: 0.883967432

00:06:31.840 --> 00:06:33.212 And really the only way to do

NOTE Confidence: 0.883967432

00:06:33.212 --> 00:06:34.649 this is from inside the tumor,

NOTE Confidence: 0.883967432

00:06:34.650 --> 00:06:35.778 not from outside.

NOTE Confidence: 0.883967432

00:06:35.778 --> 00:06:37.282 So brachytherapy involves placing

NOTE Confidence: 0.883967432

00:06:37.282 --> 00:06:39.051 radioactive source and direct contact

NOTE Confidence: 0.883967432

00:06:39.051 --> 00:06:41.109 with the tumor to kill the rapidly

NOTE Confidence: 0.883967432

00:06:41.109 --> 00:06:42.750 dividing cancer cells that are

NOTE Confidence: 0.883967432

00:06:42.750 --> 00:06:44.360 surrounding it and cervical cancer.

NOTE Confidence: 0.883967432

00:06:44.360 --> 00:06:46.096 This is done by placing a rod

NOTE Confidence: 0.883967432

00:06:46.096 --> 00:06:47.694 inside the uterus and a ring

NOTE Confidence: 0.883967432

00:06:47.694 --> 00:06:49.014 type structure in the vagina.

NOTE Confidence: 0.883967432

00:06:49.020 --> 00:06:50.332 And through these applicators,

NOTE Confidence: 0.883967432

00:06:50.332 --> 00:06:51.972 whether they're plastic or metal,

NOTE Confidence: 0.883967432

00:06:51.980 --> 00:06:53.425 we're going to deliver a

NOTE Confidence: 0.883967432

00:06:53.425 --> 00:06:54.581 radioactive source that's going

NOTE Confidence: 0.883967432

00:06:54.581 --> 00:06:56.339 to do well in these applicators.

NOTE Confidence: 0.883967432

00:06:56.340 --> 00:06:57.744 And therefore deliver a much higher

NOTE Confidence: 0.883967432

00:06:57.744 --> 00:06:59.562 dose to the tumor and in doing so

NOTE Confidence: 0.883967432

00:06:59.562 --> 00:07:00.810 with a very steep dose gradient

NOTE Confidence: 0.883967432

00:07:00.855 --> 00:07:02.303 going to give a much lower dose to

NOTE Confidence: 0.883967432

00:07:02.303 --> 00:07:03.663 any of these surrounding tissues.

NOTE Confidence: 0.883967432

00:07:03.663 --> 00:07:05.980 So unlike other types of cancers where

NOTE Confidence: 0.883967432

00:07:06.035 --> 00:07:07.817 brachytherapy is seen as an option,

NOTE Confidence: 0.883967432

00:07:07.820 --> 00:07:09.610 but there are other similar

NOTE Confidence: 0.883967432

00:07:09.610 --> 00:07:11.042 efficacious options like asperity

NOTE Confidence: 0.883967432

00:07:11.042 --> 00:07:13.008 and protons and cervical cancer,

NOTE Confidence: 0.883967432

00:07:13.010 --> 00:07:14.238 that's not the case.

NOTE Confidence: 0.883967432

00:07:14.238 --> 00:07:16.080 There is no substitute for brachytherapy

NOTE Confidence: 0.883967432

00:07:16.132 --> 00:07:17.667 because these other modalities don't

NOTE Confidence: 0.883967432

00:07:17.667 --> 00:07:19.844 allow us to achieve that very high

NOTE Confidence: 0.883967432

00:07:19.844 --> 00:07:21.614 steep dose gradient that I mentioned.

NOTE Confidence: 0.883967432

00:07:21.620 --> 00:07:23.240 But the thing about brachytherapy,

NOTE Confidence: 0.883967432

00:07:23.240 --> 00:07:24.880 it's different than external beam,

NOTE Confidence: 0.883967432

00:07:24.880 --> 00:07:27.010 it's interventional and it requires.

NOTE Confidence: 0.883967432

00:07:27.010 --> 00:07:27.892 Technical skill,

NOTE Confidence: 0.883967432

00:07:27.892 --> 00:07:29.656 but also specialized resources,

NOTE Confidence: 0.883967432

00:07:29.660 --> 00:07:30.310 different equipment,

NOTE Confidence: 0.883967432

00:07:30.310 --> 00:07:30.960 special applicators,

NOTE Confidence: 0.883967432

00:07:30.960 --> 00:07:32.910 and so not everywhere has it.

NOTE Confidence: 0.858325645333333

00:07:35.860 --> 00:07:37.400 Is this a study from 2013 from

NOTE Confidence: 0.858325645333333

00:07:37.400 --> 00:07:39.056 this year database which looked at

NOTE Confidence: 0.858325645333333

00:07:39.056 --> 00:07:40.631 cervical cancer patients with locally

NOTE Confidence: 0.858325645333333

00:07:40.631 --> 00:07:42.145 advanced disease who were treated

NOTE Confidence: 0.858325645333333

00:07:42.145 --> 00:07:43.540 with brachytherapy compared to those

NOTE Confidence: 0.858325645333333

00:07:43.540 --> 00:07:44.808 that did not receive brachytherapy.

NOTE Confidence: 0.858325645333333

00:07:44.808 --> 00:07:46.783 And you can see that the cause specific

NOTE Confidence: 0.858325645333333

00:07:46.783 --> 00:07:48.427 survival as well as the overall

NOTE Confidence: 0.858325645333333

00:07:48.427 --> 00:07:49.596 survival is significantly improved

NOTE Confidence: 0.858325645333333

00:07:49.596 --> 00:07:51.116 among those that had brachytherapy?

NOTE Confidence: 0.796137532

00:07:53.140 --> 00:07:55.460 This is a similar study from the NCDB

NOTE Confidence: 0.796137532

00:07:55.460 --> 00:07:57.670 in 2014, again more than 7000 locally

NOTE Confidence: 0.796137532

00:07:57.670 --> 00:07:58.974 advanced cervical cancer patients.

NOTE Confidence: 0.796137532

00:07:58.980 --> 00:08:00.960 And specifically asked the question is

NOTE Confidence: 0.796137532

00:08:00.960 --> 00:08:03.307 there how do patients who receive a

NOTE Confidence: 0.796137532

00:08:03.307 --> 00:08:05.251 different form of treatment to escalate

NOTE Confidence: 0.796137532

00:08:05.251 --> 00:08:07.117 those to the cervix such as SPRT,

NOTE Confidence: 0.796137532

00:08:07.120 --> 00:08:10.137 IRT compared to those who have brachytherapy.

NOTE Confidence: 0.796137532

00:08:10.140 --> 00:08:11.610 And again you can see that the

NOTE Confidence: 0.796137532

00:08:11.610 --> 00:08:13.491 women that have brachytherapy have a

NOTE Confidence: 0.796137532

00:08:13.491 --> 00:08:15.087 significantly improved overall survival.

NOTE Confidence: 0.863105389130435

00:08:20.930 --> 00:08:22.449 So here at Yale, I'm very proud

NOTE Confidence: 0.863105389130435

00:08:22.449 --> 00:08:24.270 to work with the dedicated team

NOTE Confidence: 0.863105389130435

00:08:24.270 --> 00:08:26.125 who assure highly coordinated and

NOTE Confidence: 0.863105389130435

00:08:26.125 --> 00:08:27.710 interdisciplinary care for these women.

NOTE Confidence: 0.863105389130435

00:08:27.710 --> 00:08:29.294 These pictures are just an illustration

NOTE Confidence: 0.863105389130435

00:08:29.294 --> 00:08:31.343 of some of the people who might help

NOTE Confidence: 0.863105389130435

00:08:31.343 --> 00:08:33.390 with any of these cases on a given day.

NOTE Confidence: 0.863105389130435

00:08:33.390 --> 00:08:37.173 So we work very closely with nurses in the,

NOTE Confidence: 0.863105389130435

00:08:37.173 --> 00:08:38.979 in the OR in the pacu.

NOTE Confidence: 0.863105389130435

00:08:38.980 --> 00:08:40.583 We work with the technologists in the

NOTE Confidence: 0.863105389130435

00:08:40.583 --> 00:08:42.128 MRI suite within our own department.

NOTE Confidence: 0.863105389130435

00:08:42.130 --> 00:08:43.726 We have dedicated dosimetrist,

NOTE Confidence: 0.863105389130435

00:08:43.726 --> 00:08:46.120 we have radiation therapists who are

NOTE Confidence: 0.863105389130435

00:08:46.183 --> 00:08:48.148 intimately involved in our cases,

NOTE Confidence: 0.863105389130435

00:08:48.150 --> 00:08:49.218 dedicated nursing staff,

NOTE Confidence: 0.863105389130435

00:08:49.218 --> 00:08:50.998 physics, and we have faculty.

NOTE Confidence: 0.863105389130435

00:08:51.000 --> 00:08:52.004 Within our own department,

NOTE Confidence: 0.863105389130435

00:08:52.004 --> 00:08:54.141 as well as faculty within the Joanne Oncology

NOTE Confidence: 0.863105389130435

00:08:54.141 --> 00:08:56.164 department that we work very closely with,

NOTE Confidence: 0.863105389130435

00:08:56.170 --> 00:08:57.530 for all of these cases,

NOTE Confidence: 0.863105389130435

00:08:57.530 --> 00:08:59.434 we work with coordinators,

NOTE Confidence: 0.863105389130435

00:08:59.434 --> 00:09:00.386 administrative assistance,

NOTE Confidence: 0.863105389130435

00:09:00.390 --> 00:09:01.302 nurses, residents,

NOTE Confidence: 0.863105389130435

00:09:01.302 --> 00:09:03.582 fellows from all these different

NOTE Confidence: 0.863105389130435

00:09:03.582 --> 00:09:04.950 departments listed here.

NOTE Confidence: 0.863105389130435

00:09:04.950 --> 00:09:06.686 These folks are not only committed to

NOTE Confidence: 0.863105389130435

00:09:06.686 --> 00:09:07.812 delivering high quality brachytherapy

NOTE Confidence: 0.863105389130435

00:09:07.812 --> 00:09:09.148 with safety and excellence,

NOTE Confidence: 0.863105389130435

00:09:09.150 --> 00:09:10.958 but what stands out to me is the

NOTE Confidence: 0.863105389130435

00:09:10.958 --> 00:09:12.588 compassion that they show and caring

NOTE Confidence: 0.863105389130435

00:09:12.588 --> 00:09:14.280 for the whole patient and understanding

NOTE Confidence: 0.863105389130435

00:09:14.335 --> 00:09:15.889 that this is a unique population.

NOTE Confidence: 0.863105389130435

00:09:15.890 --> 00:09:17.600 A treatment that can be painful,

NOTE Confidence: 0.863105389130435

00:09:17.600 --> 00:09:20.054 upsetting or even traumatic for patients

NOTE Confidence: 0.863105389130435

00:09:20.054 --> 00:09:22.394 and requires a recognition of that

NOTE Confidence: 0.863105389130435

00:09:22.394 --> 00:09:24.314 as well as an interpersonal touch.

NOTE Confidence: 0.863105389130435

00:09:24.320 --> 00:09:25.713 The good news that I'm going to

NOTE Confidence: 0.863105389130435

00:09:25.713 --> 00:09:27.481 share with you today is that there

NOTE Confidence: 0.863105389130435

00:09:27.481 --> 00:09:28.605 has been tremendous technological

NOTE Confidence: 0.863105389130435

00:09:28.605 --> 00:09:30.065 advances in the field of brachytherapy

NOTE Confidence: 0.863105389130435

00:09:30.065 --> 00:09:31.560 over the past 10 to 15 years,

NOTE Confidence: 0.863105389130435

00:09:31.560 --> 00:09:32.880 and I am grateful for the

NOTE Confidence: 0.863105389130435

00:09:32.880 --> 00:09:34.120 support of my department,

NOTE Confidence: 0.863105389130435

00:09:34.120 --> 00:09:35.320 the hospital and the Cancer

NOTE Confidence: 0.863105389130435

00:09:35.320 --> 00:09:36.280 Center for recognizing the

NOTE Confidence: 0.863105389130435

00:09:36.280 --> 00:09:37.290 benefits that these provide.

NOTE Confidence: 0.771358547647059

00:09:40.100 --> 00:09:41.942 Today what I'll be talking about

NOTE Confidence: 0.771358547647059

00:09:41.942 --> 00:09:44.000 is how breakey therapy evolved to

NOTE Confidence: 0.771358547647059

00:09:44.000 --> 00:09:45.915 modern MRI guided adaptive technique.

NOTE Confidence: 0.771358547647059

00:09:45.920 --> 00:09:47.873 I'm going to discuss the role of 3D printing

NOTE Confidence: 0.771358547647059

00:09:47.873 --> 00:09:49.817 and innovation and directions for future.

NOTE Confidence: 0.771358547647059

00:09:49.820 --> 00:09:51.997 I'm going to discuss training the next

NOTE Confidence: 0.771358547647059

00:09:51.997 --> 00:09:53.375 generation of brachytherapy providers

NOTE Confidence: 0.771358547647059

00:09:53.375 --> 00:09:54.959 with simulation based education.

NOTE Confidence: 0.771358547647059

00:09:54.960 --> 00:09:56.490 And finally, I'll discuss the resources

NOTE Confidence: 0.771358547647059

00:09:56.490 --> 00:09:58.358 that we have here at Yale to help

NOTE Confidence: 0.771358547647059

00:09:58.358 --> 00:10:00.174 assure that these women go on to live

NOTE Confidence: 0.771358547647059

00:10:00.174 --> 00:10:01.579 normal lives after cancer treatment,

NOTE Confidence: 0.771358547647059

00:10:01.580 --> 00:10:03.410 given the challenges and potential

NOTE Confidence: 0.771358547647059

00:10:03.410 --> 00:10:04.509 morbidities, sexual and otherwise,

NOTE Confidence: 0.771358547647059

00:10:04.509 --> 00:10:06.450 that can be associated with such treatments.

NOTE Confidence: 0.88350666

00:10:09.300 --> 00:10:11.080 So how did we get here?

NOTE Confidence: 0.901849584117647

00:10:11.080 --> 00:10:12.496 So one of the things that drew me

NOTE Confidence: 0.901849584117647

00:10:12.496 --> 00:10:14.336 to the field of radiotherapy was

NOTE Confidence: 0.901849584117647

00:10:14.336 --> 00:10:15.416 the technological advancements.

NOTE Confidence: 0.901849584117647

00:10:15.420 --> 00:10:16.914 And while that's for sure true

NOTE Confidence: 0.901849584117647

00:10:16.914 --> 00:10:18.260 and well known within our

NOTE Confidence: 0.901849584117647

00:10:18.260 --> 00:10:19.740 external beam treatments and MRT,

NOTE Confidence: 0.901849584117647

00:10:19.740 --> 00:10:21.210 it hasn't always been the

NOTE Confidence: 0.901849584117647

00:10:21.210 --> 00:10:22.386 case with breakey therapy.

NOTE Confidence: 0.901849584117647

00:10:22.390 --> 00:10:23.938 So there was a period of

NOTE Confidence: 0.901849584117647

00:10:23.938 --> 00:10:25.510 about four or five decades,

NOTE Confidence: 0.901849584117647

00:10:25.510 --> 00:10:27.127 I would say between the 1960s and

NOTE Confidence: 0.901849584117647

00:10:27.127 --> 00:10:28.222 early 2000s were brachytherapy

NOTE Confidence: 0.901849584117647

00:10:28.222 --> 00:10:29.626 really looked like this.

NOTE Confidence: 0.901849584117647

00:10:29.630 --> 00:10:30.866 It was kind of the same.

NOTE Confidence: 0.901849584117647

00:10:30.870 --> 00:10:33.150 This is called an intrauterine tandem

NOTE Confidence: 0.901849584117647

00:10:33.150 --> 00:10:34.446 that was placed inside the uterus,

NOTE Confidence: 0.901849584117647

00:10:34.450 --> 00:10:35.740 inside the operating room and

NOTE Confidence: 0.901849584117647

00:10:35.740 --> 00:10:37.370 this is called a vaginal ovoid.

NOTE Confidence: 0.901849584117647

00:10:37.370 --> 00:10:38.525 And two of these would be placed

NOTE Confidence: 0.901849584117647

00:10:38.525 --> 00:10:39.550 on either side of the cervix.

NOTE Confidence: 0.901849584117647

00:10:39.550 --> 00:10:39.770 Again,

NOTE Confidence: 0.901849584117647

00:10:39.770 --> 00:10:41.090 we would do this under anesthesia

NOTE Confidence: 0.901849584117647

00:10:41.090 --> 00:10:42.406 while the patient was in the

NOTE Confidence: 0.901849584117647

00:10:42.406 --> 00:10:43.230 operating room to surround.

NOTE Confidence: 0.901849584117647

00:10:43.230 --> 00:10:44.394 These are metal applicators

NOTE Confidence: 0.901849584117647

00:10:44.394 --> 00:10:45.849 that would surround the cervix.

NOTE Confidence: 0.901849584117647

00:10:45.850 --> 00:10:47.980 They would get packed into place

NOTE Confidence: 0.901849584117647

00:10:47.980 --> 00:10:50.437 and we would take an image of

NOTE Confidence: 0.901849584117647

00:10:50.437 --> 00:10:51.852 these applicators through these.

NOTE Confidence: 0.901849584117647

00:10:51.852 --> 00:10:52.206 Replicators.

NOTE Confidence: 0.901849584117647

00:10:52.206 --> 00:10:54.330 We would then load cesium sources

NOTE Confidence: 0.901849584117647

00:10:54.386 --> 00:10:55.989 to give off a cloud of radiation.

NOTE Confidence: 0.785653456666667

00:10:59.170 --> 00:11:01.096 So cesium sources came in different

NOTE Confidence: 0.785653456666667

00:11:01.096 --> 00:11:02.706 strengths and our physicists would

NOTE Confidence: 0.785653456666667

00:11:02.706 --> 00:11:04.631 figure out how much cesium and where

NOTE Confidence: 0.785653456666667

00:11:04.631 --> 00:11:06.464 inside these applicators to place them

NOTE Confidence: 0.785653456666667

00:11:06.464 --> 00:11:08.300 to create a symmetrical pear shaped

NOTE Confidence: 0.785653456666667

00:11:08.300 --> 00:11:09.900 distribution that looks like this.

NOTE Confidence: 0.785653456666667

00:11:09.900 --> 00:11:11.478 So we had mathematical formulas and

NOTE Confidence: 0.785653456666667

00:11:11.478 --> 00:11:13.428 lots of decades of data to know what

NOTE Confidence: 0.785653456666667

00:11:13.428 --> 00:11:15.324 type of dose we needed to get to

NOTE Confidence: 0.785653456666667

00:11:15.324 --> 00:11:16.789 these different points in relation

NOTE Confidence: 0.785653456666667

00:11:16.789 --> 00:11:18.750 to the applicators to achieve good

NOTE Confidence: 0.785653456666667

00:11:18.750 --> 00:11:20.840 outcomes local control of about 75%.

NOTE Confidence: 0.825945304

00:11:23.730 --> 00:11:25.356 In the mid 2000s things began

NOTE Confidence: 0.825945304

00:11:25.356 --> 00:11:26.440 improving in the planning,

NOTE Confidence: 0.825945304

00:11:26.440 --> 00:11:27.916 optimization and treatment delivery.

NOTE Confidence: 0.825945304

00:11:27.916 --> 00:11:30.130 We had newer applicators that were

NOTE Confidence: 0.825945304

00:11:30.188 --> 00:11:31.748 compatible with an HDR source.

NOTE Confidence: 0.825945304

00:11:31.750 --> 00:11:32.986 So basically the applicators,

NOTE Confidence: 0.825945304

00:11:32.986 --> 00:11:35.559 they were kind of the same idea tandem.

NOTE Confidence: 0.825945304

00:11:35.560 --> 00:11:36.585 This is called a ring

NOTE Confidence: 0.825945304

00:11:36.585 --> 00:11:37.610 which sits in the vagina,

NOTE Confidence: 0.825945304

00:11:37.610 --> 00:11:40.526 but after placing it, packing it,

NOTE Confidence: 0.825945304

00:11:40.530 --> 00:11:42.606 designing radiation plan rather than having

NOTE Confidence: 0.825945304

00:11:42.606 --> 00:11:45.248 a patient have to stay in the hospital.

NOTE Confidence: 0.825945304

00:11:45.250 --> 00:11:46.510 So with cesium the patients

NOTE Confidence: 0.825945304

00:11:46.510 --> 00:11:47.266 would be admitted.

NOTE Confidence: 0.825945304

00:11:47.270 --> 00:11:48.446 In order to give off the dose

NOTE Confidence: 0.825945304

00:11:48.446 --> 00:11:49.370 cloud that was necessary,

NOTE Confidence: 0.825945304

00:11:49.370 --> 00:11:51.204 the patient would have to be admitted

NOTE Confidence: 0.825945304

00:11:51.204 --> 00:11:52.980 to the hospital for 48 to 72 hours.

NOTE Confidence: 0.825945304

00:11:52.980 --> 00:11:54.264 With a decaying radioactive

NOTE Confidence: 0.825945304

00:11:54.264 --> 00:11:55.548 source inside of them.

NOTE Confidence: 0.825945304

00:11:55.550 --> 00:11:57.430 The benefit of an HDR

NOTE Confidence: 0.825945304

00:11:57.430 --> 00:11:58.934 source which is Iridium,

NOTE Confidence: 0.825945304

00:11:58.940 --> 00:12:00.361 is that the same treatment can be

NOTE Confidence: 0.825945304

00:12:00.361 --> 00:12:01.786 delivered in a course of about 10

NOTE Confidence: 0.825945304

00:12:01.786 --> 00:12:03.506 minutes and it can be done in an

NOTE Confidence: 0.825945304

00:12:03.506 --> 00:12:05.096 outpatient setting in a brachytherapy suite.

NOTE Confidence: 0.825945304

00:12:05.100 --> 00:12:07.398 So we could place the applicators,

NOTE Confidence: 0.825945304

00:12:07.400 --> 00:12:08.738 design the radiation plan and treat

NOTE Confidence: 0.825945304

00:12:08.738 --> 00:12:10.124 them in a breakey therapy suite

NOTE Confidence: 0.825945304

00:12:10.124 --> 00:12:11.692 over a period of about 10 minutes.

NOTE Confidence: 0.825945304

00:12:11.700 --> 00:12:12.930 Once the treatment was done

NOTE Confidence: 0.825945304

00:12:12.930 --> 00:12:13.914 they could go home.

NOTE Confidence: 0.825945304

00:12:13.920 --> 00:12:15.410 Another benefit of the applicators

NOTE Confidence: 0.825945304

00:12:15.410 --> 00:12:16.900 is that rather than just

NOTE Confidence: 0.825945304

00:12:16.953 --> 00:12:18.519 imaging them with a plain film,

NOTE Confidence: 0.825945304

00:12:18.520 --> 00:12:19.492 they were CT compatible.

NOTE Confidence: 0.825945304

00:12:19.492 --> 00:12:21.859 So that allowed us to not only see the

NOTE Confidence: 0.825945304

00:12:21.859 --> 00:12:23.575 applicators but actually see the nearby.

NOTE Confidence: 0.825945304

00:12:23.580 --> 00:12:23.961 Organs,

NOTE Confidence: 0.825945304

00:12:23.961 --> 00:12:25.866 the ****** the sigmoid bladder,

NOTE Confidence: 0.825945304

00:12:25.870 --> 00:12:26.402 the bowel,

NOTE Confidence: 0.825945304

00:12:26.402 --> 00:12:28.264 and we were still aiming for that

NOTE Confidence: 0.825945304

00:12:28.264 --> 00:12:29.769 symmetrical pear shaped distribution,

NOTE Confidence: 0.825945304

00:12:29.770 --> 00:12:31.850 but we were able to optimize the dwell

NOTE Confidence: 0.825945304

00:12:31.850 --> 00:12:33.728 times and sort of shrink the dose,

NOTE Confidence: 0.825945304

00:12:33.730 --> 00:12:36.018 cloud a little bit off of the surrounding

NOTE Confidence: 0.825945304

00:12:36.018 --> 00:12:38.051 organs and therefore give much lower

NOTE Confidence: 0.825945304

00:12:38.051 --> 00:12:39.796 dose to the surrounding organs.

NOTE Confidence: 0.825945304

00:12:39.800 --> 00:12:42.293 And it turns out that had a big benefit.

NOTE Confidence: 0.825945304

00:12:42.300 --> 00:12:43.728 This was shown in the stick trial

NOTE Confidence: 0.825945304

00:12:43.728 --> 00:12:45.212 which was a prospective but not

NOTE Confidence: 0.825945304

00:12:45.212 --> 00:12:46.850 randomized trial of about 800 women

NOTE Confidence: 0.825945304

00:12:46.850 --> 00:12:48.668 with locally advanced cervical cancer.

NOTE Confidence: 0.825945304

00:12:48.670 --> 00:12:50.560 And basically compared those that had

NOTE Confidence: 0.825945304

00:12:50.560 --> 00:12:52.426 the film based treatments to those

NOTE Confidence: 0.825945304

00:12:52.426 --> 00:12:54.076 that had CAT scan based treatments,

NOTE Confidence: 0.825945304

00:12:54.080 --> 00:12:56.320 SO3 dimensional seeing the organs.

NOTE Confidence: 0.825945304

00:12:56.320 --> 00:12:58.077 And you can see that local control

NOTE Confidence: 0.825945304

00:12:58.077 --> 00:12:59.599 in both groups was very good,

NOTE Confidence: 0.825945304

00:12:59.600 --> 00:13:01.390 about 75% like I mentioned.

NOTE Confidence: 0.825945304

00:13:01.390 --> 00:13:03.454 But the main advantage of switching

NOTE Confidence: 0.825945304

00:13:03.454 --> 00:13:04.892 to 3/3 dimensional imaging was

NOTE Confidence: 0.825945304

00:13:04.892 --> 00:13:06.257 there was a significant decrease

NOTE Confidence: 0.825945304

00:13:06.257 --> 00:13:07.840 in grade three to four toxicity.

NOTE Confidence: 0.825945304

00:13:07.840 --> 00:13:09.322 So in the film based era

NOTE Confidence: 0.825945304

00:13:09.322 --> 00:13:10.310 the likelihood of having.

NOTE Confidence: 0.825945304

00:13:10.310 --> 00:13:11.010 You know,

NOTE Confidence: 0.825945304

00:13:11.010 --> 00:13:12.410 bowel obstruction and perforation

NOTE Confidence: 0.825945304

00:13:12.410 --> 00:13:14.412 bleeding fistula was about 20 to 25%

NOTE Confidence: 0.825945304

00:13:14.412 --> 00:13:16.828 whereas once you see your organs and you,

NOTE Confidence: 0.825945304

00:13:16.830 --> 00:13:17.646 you know,

NOTE Confidence: 0.825945304

00:13:17.646 --> 00:13:19.686 optimize your your beam accordingly.

NOTE Confidence: 0.825945304

00:13:19.690 --> 00:13:21.184 Now the likelihood of grade 3

NOTE Confidence: 0.825945304

00:13:21.184 --> 00:13:22.730 or 4 toxicities only two to 3%.

NOTE Confidence: 0.825945304

00:13:22.730 --> 00:13:23.810 So that was a big advantage.

NOTE Confidence: 0.768999615555556

00:13:26.130 --> 00:13:27.672 The next advancement came in the

NOTE Confidence: 0.768999615555556

00:13:27.672 --> 00:13:29.230 mid 2000 tens, really pioneered in

NOTE Confidence: 0.768999615555556

00:13:29.230 --> 00:13:30.790 Europe by a group of researchers

NOTE Confidence: 0.768999615555556

00:13:30.790 --> 00:13:32.270 known as the embraced trialists.

NOTE Confidence: 0.768999615555556

00:13:32.270 --> 00:13:34.118 And what they sought to do is

NOTE Confidence: 0.768999615555556

00:13:34.118 --> 00:13:35.549 to incorporate MRI to improve

NOTE Confidence: 0.768999615555556

00:13:35.549 --> 00:13:37.004 the way we do brachytherapy

NOTE Confidence: 0.768999615555556

00:13:37.004 --> 00:13:38.709 and to improve local control.

NOTE Confidence: 0.768999615555556

00:13:38.710 --> 00:13:40.050 And really this group created

NOTE Confidence: 0.768999615555556

00:13:40.050 --> 00:13:41.390 a renaissance in the cervical

NOTE Confidence: 0.768999615555556

00:13:41.440 --> 00:13:43.008 brachytherapy community by incorporating

NOTE Confidence: 0.768999615555556

00:13:43.008 --> 00:13:44.576 MRI into treatment planning.

NOTE Confidence: 0.889294941538461

00:13:46.590 --> 00:13:48.810 So MRI has always been an

NOTE Confidence: 0.889294941538461

00:13:48.810 --> 00:13:49.920 important diagnostic imaging

NOTE Confidence: 0.889294941538461

00:13:49.920 --> 00:13:51.530 modality for cervical cancer.

NOTE Confidence: 0.889294941538461

00:13:51.530 --> 00:13:53.384 We always get an MRI up front at the

NOTE Confidence: 0.889294941538461

00:13:53.384 --> 00:13:54.947 time of staging to help determine

NOTE Confidence: 0.889294941538461

00:13:54.947 --> 00:13:56.610 the local extent of the tumor,

NOTE Confidence: 0.889294941538461

00:13:56.610 --> 00:13:58.696 if there's any involvement of the vagina,

NOTE Confidence: 0.889294941538461

00:13:58.700 --> 00:14:00.468 the uterus, the parametrium,

NOTE Confidence: 0.889294941538461

00:14:00.468 --> 00:14:01.794 the surrounding structures.

NOTE Confidence: 0.889294941538461

00:14:01.800 --> 00:14:03.120 And even in the LDR era,

NOTE Confidence: 0.889294941538461

00:14:03.120 --> 00:14:05.199 we would often get a pre brachytherapy

NOTE Confidence: 0.889294941538461

00:14:05.199 --> 00:14:07.468 MRI after about five weeks of radiation.

NOTE Confidence: 0.889294941538461

00:14:07.470 --> 00:14:09.378 This is a rapidly growing tumor,

NOTE Confidence: 0.889294941538461

00:14:09.380 --> 00:14:11.060 so it responds rapidly to radiation.

NOTE Confidence: 0.889294941538461

00:14:11.060 --> 00:14:13.292 It can shrink by about a centimeter per week.

NOTE Confidence: 0.889294941538461

00:14:13.300 --> 00:14:15.112 So getting an MRI before brachytherapy

NOTE Confidence: 0.889294941538461

00:14:15.112 --> 00:14:17.079 would give us information about you know,

NOTE Confidence: 0.889294941538461

00:14:17.080 --> 00:14:18.968 how much of the tumor is left and

NOTE Confidence: 0.889294941538461

00:14:18.968 --> 00:14:20.764 also the dimensions of the uterus

NOTE Confidence: 0.889294941538461

00:14:20.764 --> 00:14:23.000 prior to going to the operating room.

NOTE Confidence: 0.889294941538461

00:14:23.000 --> 00:14:25.056 But the embrace trial is took it one

NOTE Confidence: 0.889294941538461

00:14:25.056 --> 00:14:27.016 step further and said we could design

NOTE Confidence: 0.889294941538461

00:14:27.016 --> 00:14:29.040 applicators that are are MRI compatible.

NOTE Confidence: 0.889294941538461

00:14:29.040 --> 00:14:30.904 We can do the procedure like we've done

NOTE Confidence: 0.889294941538461

00:14:30.904 --> 00:14:32.394 place the applicators but now instead

NOTE Confidence: 0.889294941538461

00:14:32.394 --> 00:14:34.699 of going to CAT scan we can go to MRI

NOTE Confidence: 0.889294941538461

00:14:34.699 --> 00:14:36.348 and that now we can actually see the

NOTE Confidence: 0.889294941538461

00:14:36.348 --> 00:14:37.692 cervix in relation to the applicator

NOTE Confidence: 0.889294941538461

00:14:37.692 --> 00:14:39.575 and see the tumor in relation to the

NOTE Confidence: 0.889294941538461

00:14:39.575 --> 00:14:41.076 applicator and change the way that

NOTE Confidence: 0.889294941538461

00:14:41.076 --> 00:14:42.124 we prescribe radiation different

NOTE Confidence: 0.889294941538461

00:14:42.124 --> 00:14:43.984 from how we've done it for decades.

NOTE Confidence: 0.889294941538461

00:14:43.984 --> 00:14:45.860 So I mentioned for decades we were

NOTE Confidence: 0.889294941538461

00:14:45.918 --> 00:14:47.814 looking for this type of pear

NOTE Confidence: 0.889294941538461

00:14:47.814 --> 00:14:49.446 shaped distribution aiming to get

NOTE Confidence: 0.889294941538461

00:14:49.446 --> 00:14:51.282 radiation to a certain point from

NOTE Confidence: 0.889294941538461

00:14:51.282 --> 00:14:52.890 the applicators but with this.

NOTE Confidence: 0.889294941538461

00:14:52.890 --> 00:14:53.235 Anyway,

NOTE Confidence: 0.889294941538461

00:14:53.235 --> 00:14:54.960 they through they designed very

NOTE Confidence: 0.889294941538461

00:14:54.960 --> 00:14:56.530 carefully thought out and develop

NOTE Confidence: 0.889294941538461

00:14:56.530 --> 00:14:58.174 principles to allow us to deliver

NOTE Confidence: 0.889294941538461

00:14:58.174 --> 00:14:59.874 dose to the residual cervix and

NOTE Confidence: 0.889294941538461

00:14:59.874 --> 00:15:02.020 the remaining tumor as seen on MRI.

NOTE Confidence: 0.851680843571429

00:15:05.110 --> 00:15:07.390 So lots of institutions began adopting

NOTE Confidence: 0.851680843571429

00:15:07.390 --> 00:15:09.585 this approach and they presented

NOTE Confidence: 0.851680843571429

00:15:09.585 --> 00:15:11.409 their retrospective outcomes.

NOTE Confidence: 0.851680843571429

00:15:11.410 --> 00:15:13.730 And you can see here that there was

NOTE Confidence: 0.851680843571429

00:15:13.730 --> 00:15:15.301 significant improvement in local control

NOTE Confidence: 0.851680843571429

00:15:15.301 --> 00:15:17.185 when you look at these individual

NOTE Confidence: 0.851680843571429

00:15:17.185 --> 00:15:18.690 institutional studies looking like local

NOTE Confidence: 0.851680843571429

00:15:18.690 --> 00:15:20.910 control was now about 90% or higher.

NOTE Confidence: 0.851680843571429

00:15:20.910 --> 00:15:22.910 So this looked really good

NOTE Confidence: 0.851680843571429

00:15:22.910 --> 00:15:25.189 and still very low toxicity.

NOTE Confidence: 0.851680843571429

00:15:25.190 --> 00:15:27.158 The embrace trialists went on to

NOTE Confidence: 0.851680843571429

00:15:27.158 --> 00:15:29.019 develop a series of prospective

NOTE Confidence: 0.851680843571429

00:15:29.019 --> 00:15:31.929 studies following over 1000 women and

NOTE Confidence: 0.851680843571429

00:15:31.929 --> 00:15:34.009 collecting patient reported outcomes

NOTE Confidence: 0.851680843571429

00:15:34.009 --> 00:15:36.229 and validated toxicity information,

NOTE Confidence: 0.851680843571429

00:15:36.230 --> 00:15:38.406 looking not only how to optimize the way

NOTE Confidence: 0.851680843571429

00:15:38.406 --> 00:15:40.825 that we prescribe the dose to the tumor,

NOTE Confidence: 0.851680843571429

00:15:40.830 --> 00:15:42.937 but also seeking to reduce any treatment

NOTE Confidence: 0.851680843571429

00:15:42.937 --> 00:15:44.743 related morbidity and how to optimally

NOTE Confidence: 0.851680843571429

00:15:44.743 --> 00:15:46.717 constrain the dose to the normal tissues.

NOTE Confidence: 0.851680843571429

00:15:46.720 --> 00:15:50.000 And they put out very high impact

NOTE Confidence: 0.851680843571429

00:15:50.000 --> 00:15:51.890 papers showing us how we could

NOTE Confidence: 0.851680843571429

00:15:51.890 --> 00:15:53.628 monitor the dose to the ******

NOTE Confidence: 0.851680843571429

00:15:53.630 --> 00:15:54.890 to keep the rectal morbidity.

NOTE Confidence: 0.851680843571429

00:15:54.890 --> 00:15:57.020 Flow, and similarly for the bladder.

NOTE Confidence: 0.851680843571429

00:15:57.020 --> 00:15:58.798 How to decrease dose of the bladder

NOTE Confidence: 0.851680843571429

00:15:58.798 --> 00:16:00.789 and keep the bladder morbidity low.

NOTE Confidence: 0.851680843571429

00:16:00.790 --> 00:16:03.094 And they even put out data for how to

NOTE Confidence: 0.851680843571429

00:16:03.094 --> 00:16:05.700 limit dose to the vagina to produce less

NOTE Confidence: 0.851680843571429

00:16:05.700 --> 00:16:07.639 vaginal toxicity for these patients.

NOTE Confidence: 0.798732884

00:16:09.810 --> 00:16:11.970 So with all of this mounting evidence here

NOTE Confidence: 0.798732884

00:16:11.970 --> 00:16:14.792 at Yale, we were able to establish an MRI

NOTE Confidence: 0.798732884

00:16:14.792 --> 00:16:17.167 based program at around 2016 or 2017.

NOTE Confidence: 0.798732884

00:16:17.170 --> 00:16:19.258 And in order to have an MRI based program

NOTE Confidence: 0.798732884

00:16:19.258 --> 00:16:21.090 you need to have access to an MRI.

NOTE Confidence: 0.798732884

00:16:21.090 --> 00:16:22.668 So some radiation departments have an

NOTE Confidence: 0.798732884

00:16:22.668 --> 00:16:24.250 MRI simulator in their department.

NOTE Confidence: 0.798732884

00:16:24.250 --> 00:16:25.882 We do not. So like others we partner

NOTE Confidence: 0.798732884

00:16:25.882 --> 00:16:27.244 with the MRI that's available

NOTE Confidence: 0.798732884

00:16:27.244 --> 00:16:28.749 in our diagnostic imaging suite.

NOTE Confidence: 0.798732884

00:16:28.750 --> 00:16:31.070 You need to invest in MRI safe applicators,

NOTE Confidence: 0.798732884

00:16:31.070 --> 00:16:33.450 you need to meet with our radiology

NOTE Confidence: 0.798732884

00:16:33.450 --> 00:16:35.200 colleagues to develop proper sequences

NOTE Confidence: 0.798732884

00:16:35.200 --> 00:16:37.113 and protocols for imaging and you

NOTE Confidence: 0.798732884

00:16:37.113 --> 00:16:38.458 have to study the concepts,

NOTE Confidence: 0.798732884

00:16:38.460 --> 00:16:39.207 these new concepts.

NOTE Confidence: 0.798732884

00:16:39.207 --> 00:16:40.950 From the get Castro and embrace how

NOTE Confidence: 0.798732884

00:16:41.004 --> 00:16:42.726 to do these target volume delineation,

NOTE Confidence: 0.798732884

00:16:42.730 --> 00:16:44.330 you have to invest in an MRI safe

NOTE Confidence: 0.798732884

00:16:44.330 --> 00:16:45.538 transport system because you're placing

NOTE Confidence: 0.798732884

00:16:45.538 --> 00:16:47.074 applicators in the operating room and

NOTE Confidence: 0.798732884

00:16:47.074 --> 00:16:48.570 now you're taking them to the MRI.

NOTE Confidence: 0.798732884

00:16:48.570 --> 00:16:49.998 You have to have trained staff and

NOTE Confidence: 0.798732884

00:16:49.998 --> 00:16:51.674 you have to have integrated MRI

NOTE Confidence: 0.798732884

00:16:51.674 --> 00:16:52.350 safety procedures,

NOTE Confidence: 0.798732884

00:16:52.350 --> 00:16:53.222 patient questionnaires

NOTE Confidence: 0.798732884

00:16:53.222 --> 00:16:54.530 and procedural checklists.

NOTE Confidence: 0.798732884

00:16:54.530 --> 00:16:55.634 So all of this,

NOTE Confidence: 0.798732884

00:16:55.634 --> 00:16:57.692 this has been our standard way for

NOTE Confidence: 0.798732884

00:16:57.692 --> 00:16:59.060 treating cervical cancer patients

NOTE Confidence: 0.798732884

00:16:59.060 --> 00:17:01.550 for the past six or seven years.

NOTE Confidence: 0.798732884

00:17:01.550 --> 00:17:03.531 And this is what in modern MRI

NOTE Confidence: 0.798732884

00:17:03.531 --> 00:17:04.699 intracavitary tandem and ring

NOTE Confidence: 0.798732884

00:17:04.699 --> 00:17:05.767 plan might look like.

NOTE Confidence: 0.798732884

00:17:05.770 --> 00:17:07.522 You can see that the dose is very

NOTE Confidence: 0.798732884

00:17:07.522 --> 00:17:08.760 concentrated on the cervical tissue

NOTE Confidence: 0.798732884

00:17:08.760 --> 00:17:10.010 due to the physical proximity

NOTE Confidence: 0.798732884

00:17:10.010 --> 00:17:11.460 of the source to the tumor.

NOTE Confidence: 0.798732884

00:17:11.460 --> 00:17:12.990 There's a very steep dose gradient.

NOTE Confidence: 0.798732884

00:17:12.990 --> 00:17:14.590 So none of this high dose is going

NOTE Confidence: 0.798732884

00:17:14.590 --> 00:17:16.410 to any of these surrounding organs.

NOTE Confidence: 0.798732884

00:17:16.410 --> 00:17:17.916 This looks a little bit different

NOTE Confidence: 0.798732884

00:17:17.916 --> 00:17:19.417 than the old fashioned film and

NOTE Confidence: 0.798732884

00:17:19.417 --> 00:17:20.985 point based plans that I showed you.

NOTE Confidence: 0.798732884

00:17:20.990 --> 00:17:22.418 But I will mention here that

NOTE Confidence: 0.798732884

00:17:22.418 --> 00:17:24.026 because of the sort of simplicity

NOTE Confidence: 0.798732884

00:17:24.026 --> 00:17:25.844 of the applicators tandem and ring,

NOTE Confidence: 0.798732884

00:17:25.850 --> 00:17:29.539 you still have a symmetric dose distribution.

NOTE Confidence: 0.798732884

00:17:29.540 --> 00:17:31.982 But the more you start visualizing

NOTE Confidence: 0.798732884

00:17:31.982 --> 00:17:33.610 your tumors on MRI,

NOTE Confidence: 0.798732884

00:17:33.610 --> 00:17:35.128 the more you realize that not

NOTE Confidence: 0.798732884

00:17:35.128 --> 00:17:36.647 every tumor is symmetric and also

NOTE Confidence: 0.798732884

00:17:36.647 --> 00:17:38.250 not every tumor is going to be

NOTE Confidence: 0.798732884

00:17:38.250 --> 00:17:40.084 perfectly covered by one of these

NOTE Confidence: 0.798732884

00:17:40.084 --> 00:17:41.014 symmetric dose distributions.

NOTE Confidence: 0.798732884

00:17:41.020 --> 00:17:43.421 So depicted here in blue is a

NOTE Confidence: 0.798732884

00:17:43.421 --> 00:17:45.966 tumor and in red is the 100% dose

NOTE Confidence: 0.798732884

00:17:45.966 --> 00:17:46.996 that I'm trying to give.

NOTE Confidence: 0.798732884

00:17:47.000 --> 00:17:48.746 And you can see that they're

NOTE Confidence: 0.798732884

00:17:48.746 --> 00:17:50.862 aspects of this tumor in blue that

NOTE Confidence: 0.798732884

00:17:50.862 --> 00:17:52.644 are extending outside of the red.

NOTE Confidence: 0.798732884

00:17:52.650 --> 00:17:54.246 So that is with sort of pushing

NOTE Confidence: 0.798732884

00:17:54.246 --> 00:17:56.304 our dose the best that we can

NOTE Confidence: 0.798732884

00:17:56.304 --> 00:17:57.624 with our intracavitary applicator,

NOTE Confidence: 0.798732884

00:17:57.630 --> 00:17:59.120 whereas an ideal coverage depiction

NOTE Confidence: 0.798732884

00:17:59.120 --> 00:18:00.897 might look like this where the

NOTE Confidence: 0.798732884

00:18:00.897 --> 00:18:02.535 entire tumor is covered in the red.

NOTE Confidence: 0.832564517

00:18:04.710 --> 00:18:06.915 So it turns out that if you take your

NOTE Confidence: 0.832564517

00:18:06.915 --> 00:18:07.868 standard intracavitary applicator

NOTE Confidence: 0.832564517

00:18:07.868 --> 00:18:10.143 tandem and ring and you add what

NOTE Confidence: 0.832564517

00:18:10.143 --> 00:18:11.999 are called interstitial needles that

NOTE Confidence: 0.832564517

00:18:11.999 --> 00:18:14.207 look like this thin plastic needles.

NOTE Confidence: 0.832564517

00:18:14.210 --> 00:18:15.708 If you add a couple of these

NOTE Confidence: 0.832564517

00:18:15.708 --> 00:18:17.347 needles into the tumor to the parts

NOTE Confidence: 0.832564517

00:18:17.347 --> 00:18:18.769 of the tumor that are extending

NOTE Confidence: 0.832564517

00:18:18.826 --> 00:18:20.308 beyond the boundaries of what you

NOTE Confidence: 0.832564517

00:18:20.308 --> 00:18:22.022 would expect to be covered with

NOTE Confidence: 0.832564517

00:18:22.022 --> 00:18:23.466 a standard intracavitary plan,

NOTE Confidence: 0.832564517

00:18:23.470 --> 00:18:24.570 then you could significantly

NOTE Confidence: 0.832564517

00:18:24.570 --> 00:18:25.670 improve the dose coverage.

NOTE Confidence: 0.909349757

00:18:27.900 --> 00:18:30.182 And this is the birth of the

NOTE Confidence: 0.909349757

00:18:30.182 --> 00:18:31.160 so-called hybrid approach,

NOTE Confidence: 0.909349757

00:18:31.160 --> 00:18:32.936 which is basically that it's saying,

NOTE Confidence: 0.909349757

00:18:32.940 --> 00:18:34.571 it's saying that for tumors which you

NOTE Confidence: 0.909349757

00:18:34.571 --> 00:18:36.564 know are larger and might not be well

NOTE Confidence: 0.909349757

00:18:36.564 --> 00:18:37.814 covered with an intracavitary plan,

NOTE Confidence: 0.909349757

00:18:37.820 --> 00:18:39.980 you can add a couple of needles and

NOTE Confidence: 0.909349757

00:18:39.980 --> 00:18:41.759 thereby improve the dose coverage and

NOTE Confidence: 0.909349757

00:18:41.759 --> 00:18:43.860 more and more places started doing this.

NOTE Confidence: 0.909349757

00:18:43.860 --> 00:18:45.736 In fact vendors came up with hybrid

NOTE Confidence: 0.909349757

00:18:45.736 --> 00:18:47.059 applicators that look like this.

NOTE Confidence: 0.909349757

00:18:47.060 --> 00:18:48.817 So again like a tandem and ring,

NOTE Confidence: 0.909349757

00:18:48.820 --> 00:18:50.845 but within the ring applicator

NOTE Confidence: 0.909349757

00:18:50.845 --> 00:18:53.447 there are holes that allow you

NOTE Confidence: 0.909349757

00:18:53.447 --> 00:18:55.439 to thread interstitial needles.

NOTE Confidence: 0.909349757

00:18:55.440 --> 00:18:57.309 So an example of the benefit of

NOTE Confidence: 0.909349757

00:18:57.309 --> 00:18:59.120 this approach is illustrated here.

NOTE Confidence: 0.909349757

00:18:59.120 --> 00:19:00.314 This was a young woman with

NOTE Confidence: 0.909349757

00:19:00.314 --> 00:19:01.400 a very large cervical tumor,

NOTE Confidence: 0.909349757

00:19:01.400 --> 00:19:03.025 stage 3B invading into the

NOTE Confidence: 0.909349757

00:19:03.025 --> 00:19:04.000 left pelvic sidewall.

NOTE Confidence: 0.909349757

00:19:04.000 --> 00:19:06.288 She had a very large tumor that responded

NOTE Confidence: 0.909349757

00:19:06.288 --> 00:19:08.320 well to external beam radiation,

NOTE Confidence: 0.909349757

00:19:08.320 --> 00:19:09.700 but she still had a significant

NOTE Confidence: 0.909349757

00:19:09.700 --> 00:19:11.184 amount of tumor that was present

NOTE Confidence: 0.909349757

00:19:11.184 --> 00:19:12.479 at the time of brachytherapy.

NOTE Confidence: 0.909349757

00:19:12.480 --> 00:19:14.040 If she were to be treated

NOTE Confidence: 0.909349757

00:19:14.040 --> 00:19:14.820 with Intracavitary alone,

NOTE Confidence: 0.909349757

00:19:14.820 --> 00:19:16.800 you would have this circular symmetric

NOTE Confidence: 0.909349757

00:19:16.800 --> 00:19:18.520 dose distribution around the tandem.

NOTE Confidence: 0.909349757

00:19:18.520 --> 00:19:20.428 What you can see here is this is covering

NOTE Confidence: 0.909349757

00:19:20.428 --> 00:19:22.056 the anterior aspect of her tumor,

NOTE Confidence: 0.909349757

00:19:22.060 --> 00:19:23.920 but she still has tumor which

NOTE Confidence: 0.909349757

00:19:23.920 --> 00:19:25.160 is sitting laterally and.

NOTE Confidence: 0.909349757

00:19:25.160 --> 00:19:27.750 Posterior to this dose distribution.

NOTE Confidence: 0.909349757

00:19:27.750 --> 00:19:29.451 So what you could do and probably

NOTE Confidence: 0.909349757

00:19:29.451 --> 00:19:31.113 what you should do would be

NOTE Confidence: 0.909349757

00:19:31.113 --> 00:19:32.578 increase the amount of radiation

NOTE Confidence: 0.909349757

00:19:32.578 --> 00:19:34.251 you're putting in the tantum to

NOTE Confidence: 0.909349757

00:19:34.251 --> 00:19:35.546 better cover the tumor target.

NOTE Confidence: 0.909349757

00:19:35.550 --> 00:19:37.590 Here you can see now we're covering that

NOTE Confidence: 0.909349757

00:19:37.590 --> 00:19:39.630 lateral and posterior aspect of the tumor.

NOTE Confidence: 0.909349757

00:19:39.630 --> 00:19:41.820 But because of the nature of

NOTE Confidence: 0.909349757

00:19:41.820 --> 00:19:42.915 these intracavitary applicators

NOTE Confidence: 0.909349757

00:19:42.915 --> 00:19:44.249 are simultaneously increasing

NOTE Confidence: 0.909349757

00:19:44.249 --> 00:19:46.529 dose anteriorly to the bladder

NOTE Confidence: 0.909349757

00:19:46.530 --> 00:19:48.308 and that's going to result in an

NOTE Confidence: 0.909349757

00:19:48.308 --> 00:19:50.040 increased risk of bladder morbidity.

NOTE Confidence: 0.909349757

00:19:50.040 --> 00:19:53.562 So the benefit of these hybrid applicators

NOTE Confidence: 0.909349757

00:19:53.562 --> 00:19:55.970 is that rather in a case like this,

NOTE Confidence: 0.909349757

00:19:55.970 --> 00:19:58.168 you could thread needles into the lateral

NOTE Confidence: 0.909349757

00:19:58.168 --> 00:19:59.818 and posterior aspect of her tumor,

NOTE Confidence: 0.909349757

00:19:59.820 --> 00:20:00.880 which is what we did.

NOTE Confidence: 0.909349757

00:20:00.880 --> 00:20:02.644 And then you can shape the dose

NOTE Confidence: 0.909349757

00:20:02.644 --> 00:20:03.680 distribution more like this,

NOTE Confidence: 0.909349757

00:20:03.680 --> 00:20:05.365 pull that dose posteriorly to

NOTE Confidence: 0.909349757

00:20:05.365 --> 00:20:07.050 cover the target and actually

NOTE Confidence: 0.909349757

00:20:07.112 --> 00:20:08.827 simultaneously reduce the dose going

NOTE Confidence: 0.909349757

00:20:08.827 --> 00:20:11.609 to the bladder and pull the dose back

NOTE Confidence: 0.909349757

00:20:11.609 --> 00:20:13.289 to create this asymmetric target.

NOTE Confidence: 0.815388461875

00:20:15.440 --> 00:20:17.784 So what this graph shows is something that

NOTE Confidence: 0.815388461875

00:20:17.784 --> 00:20:20.256 I think a lot of departments have seen,

NOTE Confidence: 0.815388461875

00:20:20.260 --> 00:20:22.320 but once you introduce MRI,

NOTE Confidence: 0.815388461875

00:20:22.320 --> 00:20:24.350 you suddenly go from IT department where

NOTE Confidence: 0.815388461875

00:20:24.350 --> 00:20:25.896 you're doing almost no interstitial

NOTE Confidence: 0.815388461875

00:20:25.896 --> 00:20:27.466 procedures to very quickly finding

NOTE Confidence: 0.815388461875

00:20:27.466 --> 00:20:30.078 that about 50% of your cases are

NOTE Confidence: 0.815388461875

00:20:30.078 --> 00:20:32.163 being done with interstitial needles.

NOTE Confidence: 0.891907318

00:20:36.150 --> 00:20:37.970 So I think these days,

NOTE Confidence: 0.891907318

00:20:37.970 --> 00:20:39.086 customizing dose distributions

NOTE Confidence: 0.891907318

00:20:39.086 --> 00:20:40.946 on a per patient basis,

NOTE Confidence: 0.891907318

00:20:40.950 --> 00:20:42.525 we are doing this more and more.

NOTE Confidence: 0.891907318

00:20:42.530 --> 00:20:43.780 We're no longer aiming for

NOTE Confidence: 0.891907318

00:20:43.780 --> 00:20:44.780 that perfect pear shape,

NOTE Confidence: 0.891907318

00:20:44.780 --> 00:20:46.495 just dosimetry that I showed you earlier

NOTE Confidence: 0.891907318

00:20:46.495 --> 00:20:48.409 and that we did for so many decades.

NOTE Confidence: 0.891907318

00:20:48.410 --> 00:20:49.808 And maybe this seems simple for

NOTE Confidence: 0.891907318

00:20:49.808 --> 00:20:51.440 those of you in the audience,

NOTE Confidence: 0.891907318

00:20:51.440 --> 00:20:52.744 right, we're adding needles,

NOTE Confidence: 0.891907318

00:20:52.744 --> 00:20:54.048 more degrees of freedom.

NOTE Confidence: 0.891907318

00:20:54.050 --> 00:20:55.376 And yet the truth is there's

NOTE Confidence: 0.891907318

00:20:55.376 --> 00:20:56.589 a very steep learning curve

NOTE Confidence: 0.891907318

00:20:56.589 --> 00:20:57.721 within the breakthrough therapy

NOTE Confidence: 0.891907318

00:20:57.721 --> 00:20:59.402 community and it does take time

NOTE Confidence: 0.891907318

00:20:59.402 --> 00:21:00.949 for these new concepts to catch on.

NOTE Confidence: 0.891907318

00:21:00.950 --> 00:21:02.340 And that might be because

NOTE Confidence: 0.891907318

00:21:02.340 --> 00:21:03.730 by training and by nature,

NOTE Confidence: 0.891907318

00:21:03.730 --> 00:21:05.896 many of us in radiation oncology.

NOTE Confidence: 0.891907318

00:21:05.900 --> 00:21:06.616 Not interventionalists,

NOTE Confidence: 0.891907318

00:21:06.616 --> 00:21:08.048 but also sometimes there's

NOTE Confidence: 0.891907318

00:21:08.048 --> 00:21:10.074 inertia and changing the way that

NOTE Confidence: 0.891907318

00:21:10.074 --> 00:21:11.434 you've done things for decades,

NOTE Confidence: 0.891907318

00:21:11.440 --> 00:21:13.195 and also there's training and

NOTE Confidence: 0.891907318

00:21:13.195 --> 00:21:15.343 resources that are required to invest

NOTE Confidence: 0.891907318

00:21:15.343 --> 00:21:17.347 in these types of new procedures.

NOTE Confidence: 0.891907318

00:21:17.350 --> 00:21:20.738 So how common are MRI and interstitial?

NOTE Confidence: 0.891907318

00:21:20.740 --> 00:21:23.122 So this is a American breakey

NOTE Confidence: 0.891907318

00:21:23.122 --> 00:21:25.130 therapy practice survey from 2014.

NOTE Confidence: 0.891907318

00:21:25.130 --> 00:21:26.660 So it's a little bit older,

NOTE Confidence: 0.891907318

00:21:26.660 --> 00:21:29.461 but it showed that between 2007 and 2014,

NOTE Confidence: 0.891907318

00:21:29.461 --> 00:21:32.774 MRI use increased to about 34% of practices.

NOTE Confidence: 0.891907318

00:21:32.774 --> 00:21:35.280 So probably nowadays that would be more.

NOTE Confidence: 0.891907318

00:21:35.280 --> 00:21:37.752 And a 2020 Canadian Practice Survey

NOTE Confidence: 0.891907318

00:21:37.752 --> 00:21:40.099 found that between 2015 and 2020,

NOTE Confidence: 0.891907318

00:21:40.100 --> 00:21:41.084 interstitial use increased.

NOTE Confidence: 0.891907318

00:21:41.084 --> 00:21:43.052 That's the use of needles increased

NOTE Confidence: 0.891907318

00:21:43.052 --> 00:21:44.544 to about 70% of practices.

NOTE Confidence: 0.891907318

00:21:44.544 --> 00:21:47.200 So more and more places are doing this.

NOTE Confidence: 0.891907318

00:21:47.200 --> 00:21:49.162 But not everywhere and currently we

NOTE Confidence: 0.891907318

00:21:49.162 --> 00:21:51.964 are the only place in Connecticut that

NOTE Confidence: 0.891907318

00:21:51.964 --> 00:21:54.349 does MRI guided interstitial brachytherapy.

NOTE Confidence: 0.891907318

00:21:54.350 --> 00:21:56.662 So we do see a lot of referrals

NOTE Confidence: 0.891907318

00:21:56.662 --> 00:21:57.990 from around the state.

NOTE Confidence: 0.891907318

00:21:57.990 --> 00:21:59.558 This is an example of a 73 year

NOTE Confidence: 0.891907318

00:21:59.558 --> 00:22:01.572 old who had a stage 3A cervical

NOTE Confidence: 0.891907318

00:22:01.572 --> 00:22:02.824 cancer with vaginal involvement.

NOTE Confidence: 0.891907318

00:22:02.830 --> 00:22:04.360 So she was treated with pelvic

NOTE Confidence: 0.891907318

00:22:04.360 --> 00:22:05.850 radiation and an outside hospital.

NOTE Confidence: 0.891907318

00:22:05.850 --> 00:22:07.368 But because of the extent of

NOTE Confidence: 0.891907318

00:22:07.368 --> 00:22:08.127 her vaginal involvement,

NOTE Confidence: 0.891907318

00:22:08.130 --> 00:22:10.111 she was not going to be properly

NOTE Confidence: 0.891907318

00:22:10.111 --> 00:22:10.960 treated with intracavitary

NOTE Confidence: 0.891907318

00:22:11.010 --> 00:22:12.655 radiation and so she was sent here

NOTE Confidence: 0.891907318

00:22:12.655 --> 00:22:13.890 for her needle placement,

NOTE Confidence: 0.891907318

00:22:13.890 --> 00:22:15.514 which you can see here in order

NOTE Confidence: 0.891907318

00:22:15.514 --> 00:22:16.837 to better cover this vaginal

NOTE Confidence: 0.891907318

00:22:16.837 --> 00:22:17.989 extent of her disease.

NOTE Confidence: 0.874844722105263

00:22:20.000 --> 00:22:22.112 This is a 41 year old from an

NOTE Confidence: 0.874844722105263

00:22:22.112 --> 00:22:23.871 outside hospital who had a very

NOTE Confidence: 0.874844722105263

00:22:23.871 --> 00:22:25.336 large stage 4A cervical cancer.

NOTE Confidence: 0.874844722105263

00:22:25.340 --> 00:22:27.070 It was invading into local

NOTE Confidence: 0.874844722105263

00:22:27.070 --> 00:22:28.454 organs in the pelvis,

NOTE Confidence: 0.874844722105263

00:22:28.460 --> 00:22:30.196 but it was also extending very laterally.

NOTE Confidence: 0.874844722105263

00:22:30.200 --> 00:22:32.132 So you can see here what her

NOTE Confidence: 0.874844722105263

00:22:32.132 --> 00:22:33.280 dose distribution looked like.

NOTE Confidence: 0.874844722105263

00:22:33.280 --> 00:22:34.655 If she were treated with

NOTE Confidence: 0.874844722105263

00:22:34.655 --> 00:22:35.755 just tandem and ovoids,

NOTE Confidence: 0.874844722105263

00:22:35.760 --> 00:22:37.538 her dose distribution would be more narrow.

NOTE Confidence: 0.874844722105263

00:22:37.540 --> 00:22:39.748 So we added needles to extend

NOTE Confidence: 0.874844722105263

00:22:39.748 --> 00:22:41.617 her dose out laterally to

NOTE Confidence: 0.874844722105263

00:22:41.617 --> 00:22:43.555 the side walls of the pelvis.

NOTE Confidence: 0.874844722105263

00:22:43.560 --> 00:22:45.576 This was a woman who had a very

NOTE Confidence: 0.874844722105263

00:22:45.576 --> 00:22:47.226 bulky cervical tumor that had a

NOTE Confidence: 0.874844722105263

00:22:47.226 --> 00:22:48.864 lot of bulk and also intrauterine

NOTE Confidence: 0.874844722105263

00:22:48.928 --> 00:22:50.896 extent at the time of brachytherapy.

NOTE Confidence: 0.874844722105263

00:22:50.900 --> 00:22:53.318 So she benefited from this Vienna

NOTE Confidence: 0.874844722105263

00:22:53.318 --> 00:22:55.819 applicator for dose escalation to her tumor.

NOTE Confidence: 0.874844722105263

00:22:55.820 --> 00:22:57.460 And this is a young woman that had

NOTE Confidence: 0.874844722105263

00:22:57.460 --> 00:22:59.263 had a prior early stage cervical

NOTE Confidence: 0.874844722105263

00:22:59.263 --> 00:23:00.933 cancer treated with a hysterectomy

NOTE Confidence: 0.874844722105263

00:23:00.933 --> 00:23:02.492 and developed a vaginal recurrence

NOTE Confidence: 0.874844722105263

00:23:02.492 --> 00:23:05.042 mainly on the left side of her vagina.

NOTE Confidence: 0.874844722105263

00:23:05.042 --> 00:23:07.418 She would not have benefited from

NOTE Confidence: 0.874844722105263

00:23:07.420 --> 00:23:08.632 asymmetric dose distribution,

NOTE Confidence: 0.874844722105263

00:23:08.632 --> 00:23:10.652 but rather she needed needles

NOTE Confidence: 0.874844722105263

00:23:10.652 --> 00:23:12.212 preferentially in the left 4

NOTE Confidence: 0.874844722105263

00:23:12.212 --> 00:23:13.300 necks of her vagina.

NOTE Confidence: 0.874844722105263

00:23:13.300 --> 00:23:14.889 In order to give the proper dose.

NOTE Confidence: 0.869504395

00:23:17.650 --> 00:23:20.188 So as we use more needles,

NOTE Confidence: 0.869504395

00:23:20.190 --> 00:23:21.830 we realize that with MRI,

NOTE Confidence: 0.869504395

00:23:21.830 --> 00:23:23.818 it's helpful not just to sort of

NOTE Confidence: 0.869504395

00:23:23.818 --> 00:23:25.251 place everything in the operating

NOTE Confidence: 0.869504395

00:23:25.251 --> 00:23:27.347 room and then go to MRI post facto

NOTE Confidence: 0.869504395

00:23:27.406 --> 00:23:29.206 and what you get is what you get,

NOTE Confidence: 0.869504395

00:23:29.210 --> 00:23:30.638 but rather to use the MRI,

NOTE Confidence: 0.869504395

00:23:30.640 --> 00:23:32.016 especially for complicated cases

NOTE Confidence: 0.869504395

00:23:32.016 --> 00:23:34.080 to actually help guide the needles.

NOTE Confidence: 0.869504395

00:23:34.080 --> 00:23:36.708 So we do that with iterative to T2 sequences.

NOTE Confidence: 0.869504395

00:23:36.710 --> 00:23:38.702 So we'll bring the patient while

NOTE Confidence: 0.869504395

00:23:38.702 --> 00:23:40.529 they're under anesthesia to the MRI,

NOTE Confidence: 0.869504395

00:23:40.530 --> 00:23:42.245 place our needles the best we can.

NOTE Confidence: 0.869504395

00:23:42.250 --> 00:23:43.524 And if we need to make adjustments,

NOTE Confidence: 0.869504395

00:23:43.530 --> 00:23:46.204 we'll advance further deeper into the pelvis.

NOTE Confidence: 0.869504395

00:23:46.210 --> 00:23:48.016 Take another T2 sequence until we're

NOTE Confidence: 0.869504395

00:23:48.016 --> 00:23:49.900 happy with the needle adjustments.

NOTE Confidence: 0.850966563928571

00:23:51.970 --> 00:23:53.833 So this is kind of more of an MRI

NOTE Confidence: 0.850966563928571

00:23:53.833 --> 00:23:55.208 guided approach and in addition

NOTE Confidence: 0.850966563928571

00:23:55.208 --> 00:23:57.203 to everything that I told you you

NOTE Confidence: 0.850966563928571

00:23:57.203 --> 00:23:59.058 needed for an MRI based program here,

NOTE Confidence: 0.850966563928571

00:23:59.060 --> 00:24:01.292 you also need to have access to an MRI,

NOTE Confidence: 0.850966563928571

00:24:01.300 --> 00:24:03.225 excuse me to an anesthesia team available

NOTE Confidence: 0.850966563928571

00:24:03.225 --> 00:24:05.800 at the MRI which we are lucky to have here.

NOTE Confidence: 0.850966563928571

00:24:05.800 --> 00:24:07.445 We need to request extra time in

NOTE Confidence: 0.850966563928571

00:24:07.445 --> 00:24:09.125 the MRI suite because we're going

NOTE Confidence: 0.850966563928571

00:24:09.125 --> 00:24:10.660 to be taking multiple scans.

NOTE Confidence: 0.850966563928571

00:24:10.660 --> 00:24:12.436 We need time to make adjustments

NOTE Confidence: 0.850966563928571

00:24:12.436 --> 00:24:14.052 and this also requires another

NOTE Confidence: 0.850966563928571

00:24:14.052 --> 00:24:15.912 level of care coordination between

NOTE Confidence: 0.850966563928571

00:24:15.912 --> 00:24:17.762 the OR anesthesia imaging, pacu,

NOTE Confidence: 0.850966563928571

00:24:17.762 --> 00:24:18.848 GYN, oncology etcetera.

NOTE Confidence: 0.850966563928571

00:24:18.848 --> 00:24:21.580 We reserve these for our most complex.

NOTE Confidence: 0.850966563928571

00:24:21.580 --> 00:24:21.940 Cases.

NOTE Confidence: 0.826128109090909

00:24:25.190 --> 00:24:26.645 So that is our current

NOTE Confidence: 0.826128109090909

00:24:26.645 --> 00:24:28.510 state of MRI at this time.

NOTE Confidence: 0.826128109090909

00:24:28.510 --> 00:24:30.110 And I'll just mention here

NOTE Confidence: 0.826128109090909

00:24:30.110 --> 00:24:31.710 in terms of some research,

NOTE Confidence: 0.826128109090909

00:24:31.710 --> 00:24:33.480 there's research ongoing at Johns

NOTE Confidence: 0.826128109090909

00:24:33.480 --> 00:24:36.010 Hopkins led by Doctor Akila Viswanathan,

NOTE Confidence: 0.826128109090909

00:24:36.010 --> 00:24:37.540 to try to improve the efficiency

NOTE Confidence: 0.826128109090909

00:24:37.540 --> 00:24:39.161 of the MRI procedure by developing

NOTE Confidence: 0.826128109090909

00:24:39.161 --> 00:24:40.805 kind of MRI tracking devices that

NOTE Confidence: 0.826128109090909

00:24:40.805 --> 00:24:42.588 allow you to see the needles as

NOTE Confidence: 0.826128109090909

00:24:42.588 --> 00:24:43.987 you're placing them in real time.

NOTE Confidence: 0.826128109090909

00:24:43.987 --> 00:24:45.289 So who knows, maybe this will

NOTE Confidence: 0.826128109090909

00:24:45.289 --> 00:24:46.809 be the state of the field soon.

NOTE Confidence: 0.919944673333333

00:24:49.290 --> 00:24:51.210 So all of this time and effort and

NOTE Confidence: 0.919944673333333

00:24:51.210 --> 00:24:52.870 attention to detail is it worth it.

NOTE Confidence: 0.919944673333333

00:24:52.870 --> 00:24:55.090 So the data shown here would say that it is

NOTE Confidence: 0.919944673333333

00:24:55.143 --> 00:24:57.207 especially for the larger tumor targets.

NOTE Confidence: 0.919944673333333

00:24:57.210 --> 00:24:59.190 The larger that your tumor is,

NOTE Confidence: 0.919944673333333

00:24:59.190 --> 00:25:01.242 the more importance getting that proper

NOTE Confidence: 0.919944673333333

00:25:01.242 --> 00:25:04.208 dose is in order to achieve local control.

NOTE Confidence: 0.919944673333333

00:25:04.210 --> 00:25:06.415 So basically giving covering your

NOTE Confidence: 0.919944673333333

00:25:06.415 --> 00:25:08.620 tumor better is directly correlated

NOTE Confidence: 0.919944673333333

00:25:08.690 --> 00:25:10.930 with controlling your tumor better.

NOTE Confidence: 0.919944673333333

00:25:10.930 --> 00:25:13.480 And another advantage by doing these

NOTE Confidence: 0.919944673333333

00:25:13.480 --> 00:25:15.180 asymmetric dose distributions and,

NOTE Confidence: 0.919944673333333

00:25:15.180 --> 00:25:17.308 you know, pulling the dose off of

NOTE Confidence: 0.919944673333333

00:25:17.308 --> 00:25:18.870 the surrounding tissues as you're

NOTE Confidence: 0.919944673333333

00:25:18.870 --> 00:25:20.928 giving a lower dose to the surrounding

NOTE Confidence: 0.919944673333333

00:25:20.928 --> 00:25:22.720 organs and causing less morbidity.

NOTE Confidence: 0.919944673333333

00:25:22.720 --> 00:25:24.952 And now all of this has been shown

NOTE Confidence: 0.919944673333333

00:25:24.952 --> 00:25:26.758 prospectively in the embrace one trial

NOTE Confidence: 0.919944673333333

00:25:26.758 --> 00:25:28.949 which was published last year in Lancet

NOTE Confidence: 0.919944673333333

00:25:28.949 --> 00:25:31.441 Oncology which was the first large scale

NOTE Confidence: 0.919944673333333

00:25:31.441 --> 00:25:33.240 prospective study testing all these

NOTE Confidence: 0.919944673333333

00:25:33.240 --> 00:25:35.040 concepts of MRI guided brachytherapy.

NOTE Confidence: 0.919944673333333

00:25:35.040 --> 00:25:36.168 It accrued patients from

NOTE Confidence: 0.919944673333333

00:25:36.168 --> 00:25:37.296 24 centers in Europe,

NOTE Confidence: 0.919944673333333

00:25:37.300 --> 00:25:39.628 Asia and North America more than

NOTE Confidence: 0.919944673333333

00:25:39.628 --> 00:25:41.352 1400 patients between 2008 and

NOTE Confidence: 0.919944673333333

00:25:41.352 --> 00:25:43.008 2015 and results were reported at

NOTE Confidence: 0.919944673333333

00:25:43.008 --> 00:25:44.859 a median follow-up of 51 months.

NOTE Confidence: 0.919944673333333

00:25:44.860 --> 00:25:46.834 The main finding was that five year

NOTE Confidence: 0.919944673333333

00:25:46.834 --> 00:25:50.590 local control was excellent 92%.

NOTE Confidence: 0.919944673333333

00:25:50.590 --> 00:25:52.340 What was especially impressive about

NOTE Confidence: 0.919944673333333

00:25:52.340 --> 00:25:54.320 these results is that this 92%

NOTE Confidence: 0.919944673333333

00:25:54.320 --> 00:25:55.930 local control was not just in the

NOTE Confidence: 0.919944673333333

00:25:55.930 --> 00:25:57.567 stage one and two smaller tumors,

NOTE Confidence: 0.919944673333333

00:25:57.570 --> 00:25:59.190 but was true across the board.

NOTE Confidence: 0.919944673333333

00:25:59.190 --> 00:26:00.950 Even in the stage three and four tumors,

NOTE Confidence: 0.919944673333333

00:26:00.950 --> 00:26:03.104 these very large and infiltrative tumors

NOTE Confidence: 0.919944673333333

00:26:03.104 --> 00:26:05.030 still had excellent local control.

NOTE Confidence: 0.919944673333333

00:26:05.030 --> 00:26:07.483 Especially when we think back to the 75%

NOTE Confidence: 0.919944673333333

00:26:07.483 --> 00:26:11.470 that we sort of assumed in the olden days.

NOTE Confidence: 0.919944673333333

00:26:11.470 --> 00:26:12.860 They looked at overall survival

NOTE Confidence: 0.919944673333333

00:26:12.860 --> 00:26:14.616 at five years which was 74%.

NOTE Confidence: 0.919944673333333

00:26:14.616 --> 00:26:16.080 There's no direct comparison,

NOTE Confidence: 0.919944673333333

00:26:16.080 --> 00:26:17.580 but by looking back at it

NOTE Confidence: 0.919944673333333

00:26:17.580 --> 00:26:18.080 traditional cohorts,

NOTE Confidence: 0.919944673333333

00:26:18.080 --> 00:26:20.568 that's an improvement by almost 7 to 10%.

NOTE Confidence: 0.919944673333333

00:26:20.570 --> 00:26:22.106 There was significant reduction

NOTE Confidence: 0.919944673333333

00:26:22.106 --> 00:26:24.410 in dose to the surrounding organs,

NOTE Confidence: 0.919944673333333

00:26:24.410 --> 00:26:26.150 50% decrease in major morbidities

NOTE Confidence: 0.919944673333333

00:26:26.150 --> 00:26:28.450 and five year incidence of a Grade

NOTE Confidence: 0.919944673333333

00:26:28.450 --> 00:26:30.442 3 or higher toxicity on a per organ

NOTE Confidence: 0.919944673333333

00:26:30.507 --> 00:26:31.899 basis was about 3 to 9%.

NOTE Confidence: 0.919944976

00:26:33.910 --> 00:26:36.430 So these are all very positive

NOTE Confidence: 0.919944976

00:26:36.430 --> 00:26:38.110 outcomes for our patients.

NOTE Confidence: 0.919944976

00:26:38.110 --> 00:26:39.326 So what comes next?

NOTE Confidence: 0.919944976

00:26:39.326 --> 00:26:41.502 So I mentioned that for decades it

NOTE Confidence: 0.919944976

00:26:41.502 --> 00:26:43.254 seemed like the field of breakey

NOTE Confidence: 0.919944976

00:26:43.254 --> 00:26:45.523 therapy was a little bit sleepy and

NOTE Confidence: 0.919944976

00:26:45.523 --> 00:26:47.521 there wasn't much room for change.

NOTE Confidence: 0.919944976

00:26:47.530 --> 00:26:49.740 And yet here we are now in 2023,

NOTE Confidence: 0.919944976

00:26:49.740 --> 00:26:51.900 and I feel like the way we do

NOTE Confidence: 0.919944976

00:26:51.900 --> 00:26:53.220 brachytherapy is ever improving.

NOTE Confidence: 0.919944976

00:26:53.220 --> 00:26:54.228 It's getting more customized.

NOTE Confidence: 0.919944976

00:26:54.228 --> 00:26:56.090 And I think the future looks bright.

NOTE Confidence: 0.919944976

00:26:56.090 --> 00:26:58.727 And part of that is because of 3D printing.

NOTE Confidence: 0.919944976

00:26:58.730 --> 00:26:59.834 As I've shown you,

NOTE Confidence: 0.919944976

00:26:59.834 --> 00:27:01.836 every patient and every tumor is a

NOTE Confidence: 0.919944976

00:27:01.836 --> 00:27:03.588 little bit different and breakey therapy

NOTE Confidence: 0.919944976

00:27:03.588 --> 00:27:05.708 lets us get up close and personal.

NOTE Confidence: 0.919944976

00:27:05.710 --> 00:27:06.916 So the better that you do

NOTE Confidence: 0.919944976

00:27:06.916 --> 00:27:08.499 this on a per patient basis,

NOTE Confidence: 0.919944976

00:27:08.500 --> 00:27:10.648 the better her outcomes will be.

NOTE Confidence: 0.919944976

00:27:10.650 --> 00:27:11.352 But unfortunately,

NOTE Confidence: 0.919944976

00:27:11.352 --> 00:27:13.458 the regulatory system and industry are

NOTE Confidence: 0.919944976

00:27:13.458 --> 00:27:15.447 not always catching up fast enough.

NOTE Confidence: 0.919944976

00:27:15.450 --> 00:27:17.322 And although I showed you some of the

NOTE Confidence: 0.919944976

00:27:17.322 --> 00:27:18.829 modern equipment that we have available,

NOTE Confidence: 0.919944976

00:27:18.830 --> 00:27:20.279 it can take almost a decade for

NOTE Confidence: 0.919944976

00:27:20.279 --> 00:27:21.814 a new device to come to market

NOTE Confidence: 0.919944976

00:27:21.814 --> 00:27:22.889 and to be FDA approved.

NOTE Confidence: 0.919944976

00:27:22.890 --> 00:27:24.238 And it's not particularly

NOTE Confidence: 0.919944976

00:27:24.238 --> 00:27:25.923 profitable for the device companies

NOTE Confidence: 0.919944976

00:27:25.923 --> 00:27:27.388 because at the end of the day,

NOTE Confidence: 0.919944976

00:27:27.390 --> 00:27:29.174 it's just a small group of US specialized

NOTE Confidence: 0.919944976

00:27:29.174 --> 00:27:30.847 users who are doing these treatments.

NOTE Confidence: 0.919944976

00:27:30.850 --> 00:27:32.656 So a lot of the technological

NOTE Confidence: 0.919944976

00:27:32.656 --> 00:27:33.860 advancements nowadays is grassroots

NOTE Confidence: 0.919944976

00:27:33.913 --> 00:27:35.625 and ground up and led by the doctors.

NOTE Confidence: 0.919944976

00:27:35.630 --> 00:27:37.370 And maybe this is fortunate because

NOTE Confidence: 0.919944976

00:27:37.370 --> 00:27:39.074 it's forcing the people who know

NOTE Confidence: 0.919944976

00:27:39.074 --> 00:27:40.550 the field the best to innovate.

NOTE Confidence: 0.919944976

00:27:40.550 --> 00:27:42.002 So we're seeing a rising interest

NOTE Confidence: 0.919944976

00:27:42.002 --> 00:27:43.446 in 3D printing for brachytherapy

NOTE Confidence: 0.919944976

00:27:43.446 --> 00:27:45.158 because it allows customization,

NOTE Confidence: 0.919944976

00:27:45.160 --> 00:27:48.340 low cost and convenience.

NOTE Confidence: 0.919944976

00:27:48.340 --> 00:27:50.396 So this was one of the first published

NOTE Confidence: 0.919944976

00:27:50.396 --> 00:27:52.303 examples of a 3D printed customized

NOTE Confidence: 0.919944976

00:27:52.303 --> 00:27:53.973 ring applicator to guide flexible

NOTE Confidence: 0.919944976

00:27:53.973 --> 00:27:55.499 needles into a complex target.

NOTE Confidence: 0.919944976

00:27:55.500 --> 00:27:57.324 So you can see this is a cervical

NOTE Confidence: 0.919944976

00:27:57.324 --> 00:27:58.868 cancer which is extending to the

NOTE Confidence: 0.919944976

00:27:58.868 --> 00:28:00.416 sidewall and also to the vagina.

NOTE Confidence: 0.919944976

00:28:00.420 --> 00:28:02.076 Looking at this case up front,

NOTE Confidence: 0.919944976

00:28:02.080 --> 00:28:03.361 you kind of know this case is

NOTE Confidence: 0.919944976

00:28:03.361 --> 00:28:04.729 going to need at least you know,

NOTE Confidence: 0.919944976

00:28:04.730 --> 00:28:06.898 10 needles or so to properly cover it.

NOTE Confidence: 0.919944976

00:28:06.900 --> 00:28:08.745 So one way is to go to the operating

NOTE Confidence: 0.919944976

00:28:08.745 --> 00:28:10.438 room and freely place these needles

NOTE Confidence: 0.919944976

00:28:10.438 --> 00:28:12.195 and hope that your needles don't

NOTE Confidence: 0.919944976

00:28:12.195 --> 00:28:14.127 deflect and that they are going to

NOTE Confidence: 0.919944976

00:28:14.127 --> 00:28:15.664 penetrate deep enough into your tissue

NOTE Confidence: 0.919944976

00:28:15.664 --> 00:28:17.440 and land in the exact right spot.

NOTE Confidence: 0.919944976

00:28:17.440 --> 00:28:18.440 But what this group?

NOTE Confidence: 0.919944976

00:28:18.440 --> 00:28:20.576 Did is they said well based on her

NOTE Confidence: 0.919944976

00:28:20.576 --> 00:28:22.322 pre brachytherapy MRI we could design

NOTE Confidence: 0.919944976

00:28:22.322 --> 00:28:24.004 this custom ring cap that's going

NOTE Confidence: 0.919944976

00:28:24.004 --> 00:28:25.924 to go over the existing ring and

NOTE Confidence: 0.919944976

00:28:25.924 --> 00:28:28.048 they drilled holes at pre specified

NOTE Confidence: 0.919944976

00:28:28.048 --> 00:28:30.562 distance and at angles to help guide

NOTE Confidence: 0.919944976

00:28:30.562 --> 00:28:32.644 the needles into the right place.

NOTE Confidence: 0.919944976

00:28:32.650 --> 00:28:34.876 So that going into the procedure of

NOTE Confidence: 0.919944976

00:28:34.876 --> 00:28:36.656 the breakey therapist was able to

NOTE Confidence: 0.919944976

00:28:36.656 --> 00:28:38.448 place these needles at the sort of

NOTE Confidence: 0.919944976

00:28:38.513 --> 00:28:40.268 predetermined spots and better shape

NOTE Confidence: 0.919944976

00:28:40.268 --> 00:28:43.305 the needles and guide them to the tumor.

NOTE Confidence: 0.919944976

00:28:43.305 --> 00:28:43.730 So,

NOTE Confidence: 0.919944976

00:28:43.730 --> 00:28:44.580 you know,

NOTE Confidence: 0.919944976

00:28:44.580 --> 00:28:46.026 I think that there's now been

NOTE Confidence: 0.919944976

00:28:46.026 --> 00:28:48.072 a couple more of these types of

NOTE Confidence: 0.919944976

00:28:48.072 --> 00:28:49.777 published examples in the literature,

NOTE Confidence: 0.919944976

00:28:49.780 --> 00:28:51.310 and it seems like brachytherapy might

NOTE Confidence: 0.919944976

00:28:51.310 --> 00:28:53.109 be a perfect match for 3D printing,

NOTE Confidence: 0.919944976

00:28:53.110 --> 00:28:54.340 given the individualization

NOTE Confidence: 0.919944976

00:28:54.340 --> 00:28:55.980 needed for every application.

NOTE Confidence: 0.919944976

00:28:55.980 --> 00:28:59.526 We're no longer in A1 size fits all era.

NOTE Confidence: 0.887231823333333

00:28:59.530 --> 00:29:02.250 This is another example of a 3D printed

NOTE Confidence: 0.887231823333333

00:29:02.250 --> 00:29:04.038 cylinder, similarly to guide needles

NOTE Confidence: 0.887231823333333

00:29:04.038 --> 00:29:06.210 into a pair of vaginal location.

NOTE Confidence: 0.887231823333333

00:29:06.210 --> 00:29:08.360 And I will say that when you're in the OR

NOTE Confidence: 0.887231823333333

00:29:08.413 --> 00:29:10.726 in this very tight space and a very narrow

NOTE Confidence: 0.887231823333333

00:29:10.726 --> 00:29:12.606 vagina and you're trying to properly,

NOTE Confidence: 0.887231823333333

00:29:12.610 --> 00:29:14.000 you know, deflect and guide

NOTE Confidence: 0.887231823333333

00:29:14.000 --> 00:29:15.390 needles at a specific angle,

NOTE Confidence: 0.887231823333333

00:29:15.390 --> 00:29:17.430 it can be very challenging to do so.

NOTE Confidence: 0.887231823333333

00:29:17.430 --> 00:29:18.630 Having an applicator which is

NOTE Confidence: 0.887231823333333

00:29:18.630 --> 00:29:20.070 kind of doing that for you,

NOTE Confidence: 0.887231823333333

00:29:20.070 --> 00:29:21.918 it's bending and also stabilizing the needle

NOTE Confidence: 0.887231823333333

00:29:21.918 --> 00:29:23.956 in the right spot makes a lot of sense.

NOTE Confidence: 0.880266404333333

00:29:26.760 --> 00:29:28.769 This is work from a colleague of

NOTE Confidence: 0.880266404333333

00:29:28.769 --> 00:29:30.463 mine at Stanford University who

NOTE Confidence: 0.880266404333333

00:29:30.463 --> 00:29:32.393 worked together with her physicist

NOTE Confidence: 0.880266404333333

00:29:32.393 --> 00:29:34.602 and engineers at Stanford that they

NOTE Confidence: 0.880266404333333

00:29:34.602 --> 00:29:36.898 came up with these templates and they

NOTE Confidence: 0.880266404333333

00:29:36.900 --> 00:29:39.126 basically said rather than 3D customized

NOTE Confidence: 0.880266404333333

00:29:39.126 --> 00:29:41.580 printing on a per patient basis,

NOTE Confidence: 0.880266404333333

00:29:41.580 --> 00:29:43.974 rather they developed a repertoire of

NOTE Confidence: 0.880266404333333

00:29:43.974 --> 00:29:47.067 templates to have in their department to to

NOTE Confidence: 0.880266404333333

00:29:47.067 --> 00:29:50.180 use for all of their cervical cancer cases.

NOTE Confidence: 0.880266404333333

00:29:50.180 --> 00:29:52.266 So basically they designed a couple of

NOTE Confidence: 0.880266404333333

00:29:52.266 --> 00:29:53.969 3D printed templates and they choose

NOTE Confidence: 0.880266404333333

00:29:53.969 --> 00:29:55.733 one of these prior to a procedure.

NOTE Confidence: 0.880266404333333

00:29:55.740 --> 00:29:57.609 The hitch is on to the tandem.

NOTE Confidence: 0.880266404333333

00:29:57.610 --> 00:29:59.586 So they'll place a tandem and their ovoids,

NOTE Confidence: 0.880266404333333

00:29:59.590 --> 00:30:01.368 and then through one of these templates,

NOTE Confidence: 0.880266404333333

00:30:01.370 --> 00:30:02.195 guide the needles.

NOTE Confidence: 0.880266404333333

00:30:02.195 --> 00:30:04.120 It's a place and they'll figure out

NOTE Confidence: 0.880266404333333

00:30:04.173 --> 00:30:05.793 ahead of time which template would

NOTE Confidence: 0.880266404333333

00:30:05.793 --> 00:30:07.738 be best suited for a given patient.

NOTE Confidence: 0.880266404333333

00:30:07.740 --> 00:30:10.044 They found this to be a low cost

NOTE Confidence: 0.880266404333333

00:30:10.044 --> 00:30:12.164 solution and cost about $5 to print

NOTE Confidence: 0.880266404333333

00:30:12.164 --> 00:30:14.348 this in house and $100 if they.

NOTE Confidence: 0.880266404333333

00:30:14.350 --> 00:30:16.108 Sent it out to a manufacturer.

NOTE Confidence: 0.880266404333333

00:30:16.110 --> 00:30:17.951 It removes some of the variability and

NOTE Confidence: 0.880266404333333

00:30:17.951 --> 00:30:19.764 randomness of the freehand approach and

NOTE Confidence: 0.880266404333333

00:30:19.764 --> 00:30:21.708 it helps standardize the procedure more,

NOTE Confidence: 0.880266404333333

00:30:21.710 --> 00:30:23.326 and that way it can make it more

NOTE Confidence: 0.880266404333333

00:30:23.326 --> 00:30:24.602 accessible to trainees or other

NOTE Confidence: 0.880266404333333

00:30:24.602 --> 00:30:26.240 practitioners who are looking to get

NOTE Confidence: 0.880266404333333

00:30:26.240 --> 00:30:28.056 started with a hybrid application process.

NOTE Confidence: 0.7801148225

00:30:30.130 --> 00:30:32.098 This was a 3D printed applicator

NOTE Confidence: 0.7801148225

00:30:32.098 --> 00:30:34.710 from two of our own brachytherapy,

NOTE Confidence: 0.7801148225

00:30:34.710 --> 00:30:35.925 physicist Doctor Christian

NOTE Confidence: 0.7801148225

00:30:35.925 --> 00:30:37.545 and Doctor Jay Chen.

NOTE Confidence: 0.7801148225

00:30:37.550 --> 00:30:39.615 So this was printed for a patient

NOTE Confidence: 0.7801148225

00:30:39.615 --> 00:30:42.449 who had a very narrow vaginal anatomy

NOTE Confidence: 0.7801148225

00:30:42.449 --> 00:30:45.065 that wouldn't fit one of our standard

NOTE Confidence: 0.7801148225

00:30:45.065 --> 00:30:46.405 applicators and required needles.

NOTE Confidence: 0.7801148225

00:30:46.410 --> 00:30:48.546 So 3D printing can be used to rapidly

NOTE Confidence: 0.7801148225

00:30:48.546 --> 00:30:50.385 manufacture and implement customized vaginal

NOTE Confidence: 0.7801148225

00:30:50.385 --> 00:30:52.465 applicators that could be sterilized,

NOTE Confidence: 0.7801148225

00:30:52.470 --> 00:30:54.095 made of biocompatible material and

NOTE Confidence: 0.7801148225

00:30:54.095 --> 00:30:55.720 potentially result in high quality

NOTE Confidence: 0.7801148225

00:30:55.775 --> 00:30:57.019 brachytherapy for patients whose

NOTE Confidence: 0.7801148225

00:30:57.019 --> 00:30:58.885 anatomy is not ideally suited for

NOTE Confidence: 0.7801148225

00:30:58.938 --> 00:31:00.588 commercially available applicators.

NOTE Confidence: 0.7801148225

00:31:00.590 --> 00:31:02.725 And sometimes we need smaller

NOTE Confidence: 0.7801148225

00:31:02.725 --> 00:31:04.860 ones or different shaped ones.

NOTE Confidence: 0.7801148225

00:31:04.860 --> 00:31:07.128 This is a different 3D printed vaginal

NOTE Confidence: 0.7801148225

00:31:07.128 --> 00:31:08.767 applicator that we're currently testing

NOTE Confidence: 0.7801148225

00:31:08.767 --> 00:31:10.909 in a clinical trial here at Yale.

NOTE Confidence: 0.7801148225

00:31:10.910 --> 00:31:12.170 It's not for cervical cancer,

NOTE Confidence: 0.7801148225

00:31:12.170 --> 00:31:14.010 but for endometrial cancer

NOTE Confidence: 0.7801148225

00:31:14.010 --> 00:31:15.850 where vaginal brachytherapy is

NOTE Confidence: 0.7801148225

00:31:15.850 --> 00:31:18.050 typically done after hysterectomy.

NOTE Confidence: 0.7801148225

00:31:18.050 --> 00:31:19.830 So just to Orient you,

NOTE Confidence: 0.7801148225

00:31:19.830 --> 00:31:21.230 this is looking at a patient sideways,

NOTE Confidence: 0.7801148225

00:31:21.230 --> 00:31:23.070 this is the bladder, this is the ******.

NOTE Confidence: 0.7801148225

00:31:23.070 --> 00:31:25.308 And a typical applicator is this

NOTE Confidence: 0.7801148225

00:31:25.308 --> 00:31:26.427 straight vaginal applicator.

NOTE Confidence: 0.7801148225

00:31:26.430 --> 00:31:28.833 And through that we aim to give her give

NOTE Confidence: 0.7801148225

00:31:28.833 --> 00:31:31.584 a dose of radiation to the vaginal apex.

NOTE Confidence: 0.7801148225

00:31:31.590 --> 00:31:33.534 So with this trial is looking at is

NOTE Confidence: 0.7801148225

00:31:33.534 --> 00:31:35.020 asking whether if we designed the

NOTE Confidence: 0.7801148225

00:31:35.020 --> 00:31:36.782 applicator to look the same at the

NOTE Confidence: 0.7801148225

00:31:36.782 --> 00:31:38.486 top where we're giving the radiation,

NOTE Confidence: 0.7801148225

00:31:38.490 --> 00:31:40.338 but to taper and narrow as it exits

NOTE Confidence: 0.7801148225

00:31:40.338 --> 00:31:41.976 the patient through the lower portion

NOTE Confidence: 0.7801148225

00:31:41.976 --> 00:31:43.656 of the vagina and the introitus

NOTE Confidence: 0.7801148225

00:31:43.714 --> 00:31:45.388 if that would be more comfortable.

NOTE Confidence: 0.7801148225

00:31:45.390 --> 00:31:48.225 For patients and more more well tolerated.

NOTE Confidence: 0.7801148225

00:31:48.230 --> 00:31:49.796 So I mentioned the applicator here

NOTE Confidence: 0.7801148225

00:31:49.796 --> 00:31:51.679 because of the story which led to

NOTE Confidence: 0.7801148225

00:31:51.679 --> 00:31:52.984 its development as a clinician.

NOTE Confidence: 0.7801148225

00:31:52.990 --> 00:31:54.686 I had been walking around with this idea

NOTE Confidence: 0.7801148225

00:31:54.686 --> 00:31:56.689 in the back of my head for several years.

NOTE Confidence: 0.7801148225

00:31:56.690 --> 00:31:57.922 And then one day,

NOTE Confidence: 0.7801148225

00:31:57.922 --> 00:31:58.846 completely by chance,

NOTE Confidence: 0.7801148225

00:31:58.850 --> 00:32:00.383 I received an e-mail from one of

NOTE Confidence: 0.7801148225

00:32:00.383 --> 00:32:01.602 my colleagues who was working

NOTE Confidence: 0.7801148225

00:32:01.602 --> 00:32:03.132 with the medical students who had

NOTE Confidence: 0.7801148225

00:32:03.132 --> 00:32:04.634 a background in interest in 3D

NOTE Confidence: 0.7801148225

00:32:04.634 --> 00:32:05.819 printing and engineering and he

NOTE Confidence: 0.7801148225

00:32:05.819 --> 00:32:07.068 just needed a clinical application.

NOTE Confidence: 0.7801148225

00:32:07.068 --> 00:32:09.599 So the two of us met and we put our

NOTE Confidence: 0.7801148225

00:32:09.599 --> 00:32:11.405 heads together and we designed and 3D

NOTE Confidence: 0.7801148225

00:32:11.405 --> 00:32:13.211 printed this one which I mentioned

NOTE Confidence: 0.7801148225

00:32:13.211 --> 00:32:16.820 we're currently testing in a trial.

NOTE Confidence: 0.7801148225

00:32:16.820 --> 00:32:17.720 So.

NOTE Confidence: 0.7801148225

00:32:17.720 --> 00:32:19.722 I think we're still very early on

NOTE Confidence: 0.7801148225

00:32:19.722 --> 00:32:21.519 in this journey of 3D printing,

NOTE Confidence: 0.7801148225

00:32:21.520 --> 00:32:22.976 but I do know that 3D printing is

NOTE Confidence: 0.7801148225

00:32:22.976 --> 00:32:24.618 used in some of the other surgical

NOTE Confidence: 0.7801148225

00:32:24.618 --> 00:32:26.131 fields and perhaps there are others

NOTE Confidence: 0.7801148225

00:32:26.131 --> 00:32:27.811 here at the Cancer Center or the

NOTE Confidence: 0.7801148225

00:32:27.811 --> 00:32:29.041 medical school who have similar

NOTE Confidence: 0.7801148225

00:32:29.041 --> 00:32:30.276 programs and developments and would

NOTE Confidence: 0.7801148225

00:32:30.276 --> 00:32:31.640 like to collaborate with us.

NOTE Confidence: 0.7801148225

00:32:31.640 --> 00:32:33.280 As it stands now,

NOTE Confidence: 0.7801148225

00:32:33.280 --> 00:32:35.270 I think potential applications of

NOTE Confidence: 0.7801148225

00:32:35.270 --> 00:32:37.220 3D printing for cervical cancer

NOTE Confidence: 0.7801148225

00:32:37.220 --> 00:32:38.472 brachytherapy include manufacturing

NOTE Confidence: 0.7801148225

00:32:38.472 --> 00:32:39.732 personalized guidance templates

NOTE Confidence: 0.7801148225

00:32:39.732 --> 00:32:41.832 to optimize needle positions and

NOTE Confidence: 0.7801148225

00:32:41.832 --> 00:32:43.239 target dose distributions,

NOTE Confidence: 0.7801148225

00:32:43.240 --> 00:32:44.551 also designing individualized

NOTE Confidence: 0.7801148225

00:32:44.551 --> 00:32:46.736 applicators to fit patient anatomy.

NOTE Confidence: 0.7801148225

00:32:46.740 --> 00:32:48.600 And I do see this as an area of future.

NOTE Confidence: 0.7801148225

00:32:48.600 --> 00:32:49.458 Growth and promise.

NOTE Confidence: 0.873604502105263

00:32:52.600 --> 00:32:54.539 So now I'm going to talk about

NOTE Confidence: 0.873604502105263

00:32:54.539 --> 00:32:56.741 efforts to improve the way that we

NOTE Confidence: 0.873604502105263

00:32:56.741 --> 00:32:58.376 teach brachytherapy to our trainees.

NOTE Confidence: 0.873604502105263

00:32:58.380 --> 00:32:59.994 So I mentioned in the beginning

NOTE Confidence: 0.873604502105263

00:32:59.994 --> 00:33:01.913 of my talk that without breakey

NOTE Confidence: 0.873604502105263

00:33:01.913 --> 00:33:03.473 therapy survival outcomes in

NOTE Confidence: 0.873604502105263

00:33:03.473 --> 00:33:05.549 cervical cancer are not as good.

NOTE Confidence: 0.873604502105263

00:33:05.550 --> 00:33:07.881 And yet the same research has shown

NOTE Confidence: 0.873604502105263

00:33:07.881 --> 00:33:10.318 a disturbing high recent decline in

NOTE Confidence: 0.873604502105263

00:33:10.318 --> 00:33:12.150 the utilization of brachytherapy.

NOTE Confidence: 0.873604502105263

00:33:12.150 --> 00:33:15.346 So specifically between 1998 and 2009,

NOTE Confidence: 0.873604502105263

00:33:15.346 --> 00:33:17.362 it was estimated there was a

NOTE Confidence: 0.873604502105263

00:33:17.362 --> 00:33:18.817 decreased utilization rate of

NOTE Confidence: 0.873604502105263

00:33:18.817 --> 00:33:21.288 brachytherapy from 83% to 58%.

NOTE Confidence: 0.873604502105263

00:33:21.288 --> 00:33:22.986 And also data,

NOTE Confidence: 0.873604502105263

00:33:22.990 --> 00:33:24.904 the research has shown that patients

NOTE Confidence: 0.873604502105263

00:33:24.904 --> 00:33:27.364 are less likely to receive standard of

NOTE Confidence: 0.873604502105263

00:33:27.364 --> 00:33:29.608 care treatments at low volume centers.

NOTE Confidence: 0.873604502105263

00:33:29.610 --> 00:33:31.409 There has been a lot of thought

NOTE Confidence: 0.873604502105263

00:33:31.409 --> 00:33:32.991 and writing about this particular

NOTE Confidence: 0.873604502105263

00:33:32.991 --> 00:33:35.259 problem and the potential causes for

NOTE Confidence: 0.873604502105263

00:33:35.259 --> 00:33:36.750 underutilization of radiotherapy.

NOTE Confidence: 0.873604502105263

00:33:36.750 --> 00:33:38.847 It could be because of a lack of equipment,

NOTE Confidence: 0.873604502105263

00:33:38.850 --> 00:33:40.550 because of the intensive workflow.

NOTE Confidence: 0.873604502105263

00:33:40.550 --> 00:33:41.876 If you're at a smaller practice,

NOTE Confidence: 0.873604502105263

00:33:41.880 --> 00:33:43.218 you're treating all types of cancers.

NOTE Confidence: 0.873604502105263

00:33:43.220 --> 00:33:44.696 Maybe you don't have the time

NOTE Confidence: 0.873604502105263

00:33:44.696 --> 00:33:46.274 and resources for this type of

NOTE Confidence: 0.873604502105263

00:33:46.274 --> 00:33:47.350 a cervical cancer program.

NOTE Confidence: 0.873604502105263

00:33:47.350 --> 00:33:48.930 There's also patient access issues.

NOTE Confidence: 0.873604502105263

00:33:48.930 --> 00:33:50.590 Not everyone can travel

NOTE Confidence: 0.873604502105263

00:33:50.590 --> 00:33:52.250 for these treatments and.

NOTE Confidence: 0.873604502105263

00:33:52.250 --> 00:33:54.176 Something that's also come out of

NOTE Confidence: 0.873604502105263

00:33:54.176 --> 00:33:56.253 numerous surveys is perhaps we aren't

NOTE Confidence: 0.873604502105263

00:33:56.253 --> 00:33:57.725 properly training our residents,

NOTE Confidence: 0.873604502105263

00:33:57.730 --> 00:34:00.089 and there was a survey of recent

NOTE Confidence: 0.873604502105263

00:34:00.089 --> 00:34:02.378 grads and trainees who felt that not

NOTE Confidence: 0.873604502105263

00:34:02.378 --> 00:34:04.661 seeing a lot of cases during their

NOTE Confidence: 0.873604502105263

00:34:04.661 --> 00:34:06.995 residency training was a very big

NOTE Confidence: 0.873604502105263

00:34:06.995 --> 00:34:08.764 barrier to learning breakey therapy.

NOTE Confidence: 0.873604502105263

00:34:08.764 --> 00:34:10.843 So perhaps people were coming out of

NOTE Confidence: 0.873604502105263

00:34:10.843 --> 00:34:12.608 training and not feeling comfortable or

NOTE Confidence: 0.873604502105263

00:34:12.608 --> 00:34:14.840 confident that they could do breakey therapy.

NOTE Confidence: 0.873604502105263

00:34:14.840 --> 00:34:17.032 So as a field, we've realized that we

NOTE Confidence: 0.873604502105263

00:34:17.032 --> 00:34:19.656 need to improve the way that we teach it,

NOTE Confidence: 0.873604502105263

00:34:19.660 --> 00:34:21.908 to make it more accessible and to change

NOTE Confidence: 0.873604502105263

00:34:21.908 --> 00:34:23.700 its perception from being an advanced,

NOTE Confidence: 0.873604502105263

00:34:23.700 --> 00:34:25.685 technically challenging technique to one

NOTE Confidence: 0.873604502105263

00:34:25.685 --> 00:34:28.240 that's a component of routine practice.

NOTE Confidence: 0.873604502105263

00:34:28.240 --> 00:34:30.130 So it's hard to teach breakey

NOTE Confidence: 0.873604502105263

00:34:30.130 --> 00:34:31.840 therapy in real time cases.

NOTE Confidence: 0.873604502105263

00:34:31.840 --> 00:34:32.924 The stakes are high,

NOTE Confidence: 0.873604502105263

00:34:32.924 --> 00:34:34.008 the patients under anesthesia,

NOTE Confidence: 0.873604502105263

00:34:34.010 --> 00:34:35.620 things are moving pretty quickly.

NOTE Confidence: 0.873604502105263

00:34:35.620 --> 00:34:36.760 So to supplement training,

NOTE Confidence: 0.873604502105263

00:34:36.760 --> 00:34:38.470 there's been a growing interest in

NOTE Confidence: 0.873604502105263

00:34:38.518 --> 00:34:40.058 doing simulation based education,

NOTE Confidence: 0.873604502105263

00:34:40.060 --> 00:34:41.842 which basically means using a pelvic

NOTE Confidence: 0.873604502105263

00:34:41.842 --> 00:34:43.357 mannequin in a setting outside

NOTE Confidence: 0.873604502105263

00:34:43.357 --> 00:34:45.261 of the OR where you can conduct

NOTE Confidence: 0.873604502105263

00:34:45.261 --> 00:34:46.985 workshops with residents and they can

NOTE Confidence: 0.873604502105263

00:34:46.985 --> 00:34:48.677 have the opportunity to place the

NOTE Confidence: 0.873604502105263

00:34:48.680 --> 00:34:51.836 applicators in a low risk setting.

NOTE Confidence: 0.873604502105263

00:34:51.840 --> 00:34:54.088 And this has been shown to help trainees

NOTE Confidence: 0.873604502105263

00:34:54.088 --> 00:34:55.860 remember the steps of the procedure

NOTE Confidence: 0.873604502105263

00:34:55.860 --> 00:34:58.170 and feel confident in doing the procedure.

NOTE Confidence: 0.873604502105263

00:34:58.170 --> 00:34:59.586 So that they're more likely to do it

NOTE Confidence: 0.873604502105263

00:34:59.586 --> 00:35:01.110 when they go out in their own practice.

NOTE Confidence: 0.873604502105263

00:35:01.110 --> 00:35:01.887 And I've been,

NOTE Confidence: 0.873604502105263

00:35:01.887 --> 00:35:03.700 I've been able to participate in these

NOTE Confidence: 0.873604502105263

00:35:03.750 --> 00:35:05.510 workshops at an institutional level,

NOTE Confidence: 0.873604502105263

00:35:05.510 --> 00:35:07.508 also at national and international meetings,

NOTE Confidence: 0.873604502105263

00:35:07.510 --> 00:35:10.048 and this picture is taken from work that I

NOTE Confidence: 0.873604502105263

00:35:10.048 --> 00:35:14.620 did during my sabbatical and in Israel so.

NOTE Confidence: 0.873604502105263

00:35:14.620 --> 00:35:16.498 I also mentioned earlier in my

NOTE Confidence: 0.873604502105263

00:35:16.498 --> 00:35:18.234 talk the movement towards more

NOTE Confidence: 0.873604502105263

00:35:18.234 --> 00:35:19.934 customized applications using needles

NOTE Confidence: 0.873604502105263

00:35:19.934 --> 00:35:22.059 into the residual cervical tumor.

NOTE Confidence: 0.873604502105263

00:35:22.060 --> 00:35:22.948 For a long time,

NOTE Confidence: 0.873604502105263

00:35:22.948 --> 00:35:24.058 the mannequins that were available

NOTE Confidence: 0.873604502105263

00:35:24.058 --> 00:35:25.396 to us were very kind of hard,

NOTE Confidence: 0.873604502105263

00:35:25.400 --> 00:35:26.712 durable plastic material that

NOTE Confidence: 0.873604502105263

00:35:26.712 --> 00:35:28.352 wasn't very stretchy and didn't

NOTE Confidence: 0.873604502105263

00:35:28.352 --> 00:35:29.939 really permit needle placements.

NOTE Confidence: 0.873604502105263

00:35:29.940 --> 00:35:31.149 But in 2021,

NOTE Confidence: 0.873604502105263

00:35:31.149 --> 00:35:33.567 a new prototype Phantom was released.

NOTE Confidence: 0.873604502105263

00:35:33.570 --> 00:35:35.604 This model was made of this

NOTE Confidence: 0.873604502105263

00:35:35.604 --> 00:35:36.960 colloidal material that it

NOTE Confidence: 0.817171624166667

00:35:37.024 --> 00:35:39.328 was stretchy, it had a vagina,

NOTE Confidence: 0.817171624166667

00:35:39.328 --> 00:35:41.196 cervix, uterus, ****** and bladder,

NOTE Confidence: 0.817171624166667

00:35:41.196 --> 00:35:43.440 and it also permitted our applicators

NOTE Confidence: 0.817171624166667

00:35:43.503 --> 00:35:44.825 as well as needle. Placements.

NOTE Confidence: 0.817171624166667

00:35:44.825 --> 00:35:46.535 So we designed an inaugural workshop

NOTE Confidence: 0.817171624166667

00:35:46.535 --> 00:35:48.690 here at Yale to validate the model

NOTE Confidence: 0.817171624166667

00:35:48.690 --> 00:35:50.250 for teaching hybrid needle placements.

NOTE Confidence: 0.817171624166667

00:35:50.250 --> 00:35:52.050 We presented this work at ABS,

NOTE Confidence: 0.817171624166667

00:35:52.050 --> 00:35:53.686 the American Brachytherapy Society,

NOTE Confidence: 0.817171624166667

00:35:53.686 --> 00:35:56.660 last year and recently published our results.

NOTE Confidence: 0.817171624166667

00:35:56.660 --> 00:35:58.172 This was from the 14 residents

NOTE Confidence: 0.817171624166667

00:35:58.172 --> 00:35:59.846 in our program who were surveyed

NOTE Confidence: 0.817171624166667

00:35:59.846 --> 00:36:01.670 and this was their responses to

NOTE Confidence: 0.817171624166667

00:36:01.670 --> 00:36:03.259 questions pre and post workshop.

NOTE Confidence: 0.817171624166667

00:36:03.260 --> 00:36:04.870 We asked them questions about

NOTE Confidence: 0.817171624166667

00:36:04.870 --> 00:36:06.002 their knowledge, preparedness,

NOTE Confidence: 0.817171624166667

00:36:06.002 --> 00:36:07.930 confidence in performing hybrid

NOTE Confidence: 0.817171624166667

00:36:07.930 --> 00:36:08.894 brachytherapy procedures.

NOTE Confidence: 0.817171624166667

00:36:08.900 --> 00:36:10.286 Red meant that they were not

NOTE Confidence: 0.817171624166667

00:36:10.286 --> 00:36:10.979 at all confident,

NOTE Confidence: 0.817171624166667

00:36:10.980 --> 00:36:12.499 blue meant that they were very confident.

NOTE Confidence: 0.817171624166667

00:36:12.500 --> 00:36:14.372 So you can see the shift in responses

NOTE Confidence: 0.817171624166667

00:36:14.372 --> 00:36:16.219 from pre workshop to post workshop.

NOTE Confidence: 0.817171624166667

00:36:16.220 --> 00:36:18.460 Obviously we know you can't do this workshop

NOTE Confidence: 0.817171624166667

00:36:18.460 --> 00:36:20.880 one time and expect everyone to be experts,

NOTE Confidence: 0.817171624166667

00:36:20.880 --> 00:36:24.810 but there are lots of.

NOTE Confidence: 0.817171624166667

00:36:24.810 --> 00:36:26.334 Uh, there's lots of programs and

NOTE Confidence: 0.817171624166667

00:36:26.334 --> 00:36:27.753 development at a national level

NOTE Confidence: 0.817171624166667

00:36:27.753 --> 00:36:29.157 to improve brachytherapy training,

NOTE Confidence: 0.817171624166667

00:36:29.160 --> 00:36:30.854 but at least at an institutional level,

NOTE Confidence: 0.817171624166667

00:36:30.860 --> 00:36:32.816 we hope to continue conducting similar

NOTE Confidence: 0.817171624166667

00:36:32.816 --> 00:36:34.759 hands-on workshops yearly in our program.

NOTE Confidence: 0.903963375

00:36:38.300 --> 00:36:40.334 So in the last few minutes I'm going to

NOTE Confidence: 0.903963375

00:36:40.334 --> 00:36:42.628 shift gears and talk about quality of life

NOTE Confidence: 0.903963375

00:36:42.628 --> 00:36:44.349 and survivorship and cervical cancer.

NOTE Confidence: 0.903963375

00:36:44.350 --> 00:36:45.686 This is another area at Yale that we

NOTE Confidence: 0.903963375

00:36:45.686 --> 00:36:47.561 have a lot of support with help from our

NOTE Confidence: 0.903963375

00:36:47.561 --> 00:36:49.140 behavioral health and gynecologic colleagues,

NOTE Confidence: 0.903963375

00:36:49.140 --> 00:36:50.967 to make sure that our patients are

NOTE Confidence: 0.903963375

00:36:50.967 --> 00:36:52.729 on board with this information.

NOTE Confidence: 0.903963375

00:36:52.730 --> 00:36:53.670 As I think I've shown,

NOTE Confidence: 0.903963375

00:36:53.670 --> 00:36:55.945 breakey therapy is a very personal treatment,

NOTE Confidence: 0.903963375

00:36:55.950 --> 00:36:57.594 and while going through it can

NOTE Confidence: 0.903963375

00:36:57.594 --> 00:36:58.690 be intense and emotional,

NOTE Confidence: 0.903963375

00:36:58.690 --> 00:37:00.546 for some women it could even be traumatic

NOTE Confidence: 0.903963375

00:37:00.546 --> 00:37:02.601 that we do our best to offer compassion

NOTE Confidence: 0.903963375

00:37:02.601 --> 00:37:04.200 and support every step of the way.

NOTE Confidence: 0.903963375

00:37:04.200 --> 00:37:04.696 Post treatment,

NOTE Confidence: 0.903963375

00:37:04.696 --> 00:37:06.680 even if the cancer is cured and the

NOTE Confidence: 0.903963375

00:37:06.733 --> 00:37:08.335 patient wants to forget about it,

NOTE Confidence: 0.903963375

00:37:08.340 --> 00:37:09.384 put it behind them.

NOTE Confidence: 0.903963375

00:37:09.384 --> 00:37:11.373 The problem is that there can be

NOTE Confidence: 0.903963375

00:37:11.373 --> 00:37:12.459 significant long-term sequelae

NOTE Confidence: 0.903963375

00:37:12.459 --> 00:37:14.269 which take time to develop.

NOTE Confidence: 0.903963375

00:37:14.270 --> 00:37:15.985 These can be sexual or other effects

NOTE Confidence: 0.903963375

00:37:15.985 --> 00:37:17.286 that can negatively and permanently

NOTE Confidence: 0.903963375

00:37:17.286 --> 00:37:18.834 impact the lives of our patients

NOTE Confidence: 0.903963375

00:37:18.834 --> 00:37:20.409 if they're not properly addressed.

NOTE Confidence: 0.903963375

00:37:20.410 --> 00:37:22.370 But many of these issues can be addressed,

NOTE Confidence: 0.903963375

00:37:22.370 --> 00:37:23.378 treated or even prevented.

NOTE Confidence: 0.903963375

00:37:23.378 --> 00:37:25.304 So we have to follow our patients

NOTE Confidence: 0.903963375

00:37:25.304 --> 00:37:26.028 very closely.

NOTE Confidence: 0.903963375

00:37:26.030 --> 00:37:27.042 So in my opinion,

NOTE Confidence: 0.903963375

00:37:27.042 --> 00:37:28.560 post treatment care of women who've

NOTE Confidence: 0.903963375

00:37:28.613 --> 00:37:30.335 been through breaking therapy is a

NOTE Confidence: 0.903963375

00:37:30.335 --> 00:37:32.017 critical aspect of caring for the

NOTE Confidence: 0.903963375

00:37:32.017 --> 00:37:33.475 whole patient because we don't want

NOTE Confidence: 0.903963375

00:37:33.475 --> 00:37:35.368 to save one part of their lives and

NOTE Confidence: 0.903963375

00:37:35.368 --> 00:37:36.550 then accidentally ruin another part.

NOTE Confidence: 0.881755205714286

00:37:39.090 --> 00:37:41.698 So this is just an example of what

NOTE Confidence: 0.881755205714286

00:37:41.698 --> 00:37:44.668 happens to vaginal tissue after radiation.

NOTE Confidence: 0.881755205714286

00:37:44.670 --> 00:37:46.510 Now we all know that whatever your treatment

NOTE Confidence: 0.881755205714286

00:37:46.510 --> 00:37:48.338 modality is, whether it's surgery,

NOTE Confidence: 0.881755205714286

00:37:48.338 --> 00:37:50.466 chemotherapy or radiation, the name of

NOTE Confidence: 0.881755205714286

00:37:50.466 --> 00:37:52.230 the game is to minimize side effects.

NOTE Confidence: 0.881755205714286

00:37:52.230 --> 00:37:54.516 So here's what happens after radiation.

NOTE Confidence: 0.881755205714286

00:37:54.520 --> 00:37:56.249 This is a biopsy from a healthy,

NOTE Confidence: 0.881755205714286

00:37:56.250 --> 00:37:57.180 normal vagina.

NOTE Confidence: 0.881755205714286

00:37:57.180 --> 00:38:00.422 This is looking in the in the basil

NOTE Confidence: 0.881755205714286

00:38:00.422 --> 00:38:03.210 layer and you can see this is elastin,

NOTE Confidence: 0.881755205714286

00:38:03.210 --> 00:38:04.760 which is imaged with autofluorescence

NOTE Confidence: 0.881755205714286

00:38:04.760 --> 00:38:06.730 and it looks nice and linear.

NOTE Confidence: 0.881755205714286

00:38:06.730 --> 00:38:07.633 This is biopsy.

NOTE Confidence: 0.881755205714286

00:38:07.633 --> 00:38:10.170 From the vagina of a cervical cancer patient

NOTE Confidence: 0.881755205714286

00:38:10.170 --> 00:38:12.354 three to five years after radiation.

NOTE Confidence: 0.881755205714286

00:38:12.360 --> 00:38:13.320 So again it takes time,

NOTE Confidence: 0.881755205714286

00:38:13.320 --> 00:38:15.600 but what you can see is proliferation and

NOTE Confidence: 0.881755205714286

00:38:15.600 --> 00:38:17.803 elastosis and this can lead to progressive

NOTE Confidence: 0.881755205714286

00:38:17.803 --> 00:38:19.800 thickening and stiffening of the vagina.

NOTE Confidence: 0.881755205714286

00:38:19.800 --> 00:38:21.585 This can take months to years to

NOTE Confidence: 0.881755205714286

00:38:21.585 --> 00:38:22.897 develop after radiation and its

NOTE Confidence: 0.881755205714286

00:38:22.897 --> 00:38:23.897 effects can be permanent,

NOTE Confidence: 0.881755205714286

00:38:23.900 --> 00:38:25.300 results in difficulty with

NOTE Confidence: 0.881755205714286

00:38:25.300 --> 00:38:27.050 exam or pain with intercourse.

NOTE Confidence: 0.881755205714286

00:38:27.050 --> 00:38:29.846 So vaginal morbidity to some extent,

NOTE Confidence: 0.881755205714286

00:38:29.850 --> 00:38:31.760 whether it's mucosal adhesions or

NOTE Confidence: 0.881755205714286

00:38:31.760 --> 00:38:34.130 bleeding after radiation is pretty common.

NOTE Confidence: 0.881755205714286

00:38:34.130 --> 00:38:34.979 And you know,

NOTE Confidence: 0.881755205714286

00:38:34.979 --> 00:38:36.960 even if it's mild that can have

NOTE Confidence: 0.881755205714286

00:38:37.027 --> 00:38:38.350 a significant impact.

NOTE Confidence: 0.881755205714286

00:38:38.350 --> 00:38:40.688 On sexual function and the impact goes

NOTE Confidence: 0.881755205714286

00:38:40.688 --> 00:38:42.620 beyond the physical manifestations.

NOTE Confidence: 0.881755205714286

00:38:42.620 --> 00:38:44.307 Studies have shown that one to four,

NOTE Confidence: 0.881755205714286

00:38:44.310 --> 00:38:46.422 one to five cervical cancer patients

NOTE Confidence: 0.881755205714286

00:38:46.422 --> 00:38:48.550 have vaginal issues causing dyspareunia,

NOTE Confidence: 0.881755205714286

00:38:48.550 --> 00:38:50.764 and a significant proportion of these

NOTE Confidence: 0.881755205714286

00:38:50.764 --> 00:38:53.101 women stay sexually active despite pain

NOTE Confidence: 0.881755205714286

00:38:53.101 --> 00:38:55.091 to maintain their partner satisfaction

NOTE Confidence: 0.881755205714286

00:38:55.091 --> 00:38:57.330 and avoid marital marital problems.

NOTE Confidence: 0.881755205714286

00:38:57.330 --> 00:38:59.619 So this is a pretty complex problem.

NOTE Confidence: 0.881755205714286

00:38:59.620 --> 00:39:01.104 Physical symptoms can lead

NOTE Confidence: 0.881755205714286

00:39:01.104 --> 00:39:03.330 to all of these issues here,

NOTE Confidence: 0.881755205714286

00:39:03.330 --> 00:39:05.046 whether it's distress, fear of pain,

NOTE Confidence: 0.881755205714286

00:39:05.050 --> 00:39:06.578 cancer, loss of femininity,

NOTE Confidence: 0.881755205714286

00:39:06.578 --> 00:39:07.724 decreased body image,

NOTE Confidence: 0.881755205714286

00:39:07.730 --> 00:39:08.771 difficulty with partner.

NOTE Confidence: 0.881755205714286

00:39:08.771 --> 00:39:09.118 Communication.

NOTE Confidence: 0.881755205714286

00:39:09.118 --> 00:39:11.200 A very simplified example of this

NOTE Confidence: 0.881755205714286

00:39:11.252 --> 00:39:12.848 would be a young cervical cancer

NOTE Confidence: 0.881755205714286

00:39:12.848 --> 00:39:14.440 patient is treated with radiation.

NOTE Confidence: 0.881755205714286

00:39:14.440 --> 00:39:16.168 She has pelvic issues that result

NOTE Confidence: 0.881755205714286

00:39:16.168 --> 00:39:17.320 in problems with dyspareunia.

NOTE Confidence: 0.881755205714286

00:39:17.320 --> 00:39:18.880 She doesn't bring it up with her doctors.

NOTE Confidence: 0.881755205714286

00:39:18.880 --> 00:39:20.064 She remains sexually active,

NOTE Confidence: 0.881755205714286

00:39:20.064 --> 00:39:21.840 albeit with tremendous pain and suffering.

NOTE Confidence: 0.881755205714286

00:39:21.840 --> 00:39:24.300 She has relationship issues that result.

NOTE Confidence: 0.881755205714286

00:39:24.300 --> 00:39:25.164 Her partner leaves her,

NOTE Confidence: 0.881755205714286

00:39:25.164 --> 00:39:26.775 she has low self esteem and she

NOTE Confidence: 0.881755205714286

00:39:26.775 --> 00:39:28.115 thinks something's wrong with her.

NOTE Confidence: 0.881755205714286

00:39:28.120 --> 00:39:29.905 I'm not saying that we as radiation

NOTE Confidence: 0.881755205714286

00:39:29.905 --> 00:39:31.176 oncologists can help with all

NOTE Confidence: 0.881755205714286

00:39:31.176 --> 00:39:31.860 of those issues,

NOTE Confidence: 0.881755205714286

00:39:31.860 --> 00:39:33.428 but we could do a lot simply by

NOTE Confidence: 0.881755205714286

00:39:33.428 --> 00:39:34.576 raising and normalizing sexual

NOTE Confidence: 0.881755205714286

00:39:34.576 --> 00:39:35.980 concerns with our patients,

NOTE Confidence: 0.881755205714286

00:39:35.980 --> 00:39:37.595 asking them about what they're

NOTE Confidence: 0.881755205714286

00:39:37.595 --> 00:39:38.887 experiencing and making appropriate.

NOTE Confidence: 0.881755205714286

00:39:38.890 --> 00:39:39.727 Girls when needed.

NOTE Confidence: 0.881755205714286

00:39:39.727 --> 00:39:41.680 So one simple thing that we can

NOTE Confidence: 0.881755205714286

00:39:41.745 --> 00:39:43.936 do is really just ask our patients

NOTE Confidence: 0.881755205714286

00:39:43.936 --> 00:39:44.875 about their symptoms.

NOTE Confidence: 0.881755205714286

00:39:44.880 --> 00:39:47.455 So this is guidelines that

NOTE Confidence: 0.881755205714286

00:39:47.455 --> 00:39:49.515 were written by ASCO,

NOTE Confidence: 0.881755205714286

00:39:49.520 --> 00:39:50.745 so I'd encourage you all to take

NOTE Confidence: 0.881755205714286

00:39:50.745 --> 00:39:52.191 a look at this if you haven't seen

NOTE Confidence: 0.881755205714286

00:39:52.191 --> 00:39:53.938 it was put out in 2018 looking at

NOTE Confidence: 0.881755205714286

00:39:53.938 --> 00:39:55.038 interventions to address sexual

NOTE Confidence: 0.881755205714286

00:39:55.038 --> 00:39:56.506 problems in people with cancer.

NOTE Confidence: 0.881755205714286

00:39:56.506 --> 00:39:58.414 The number one recommendation is that

NOTE Confidence: 0.881755205714286

00:39:58.414 --> 00:39:59.922 it's the provider's responsibility

NOTE Confidence: 0.881755205714286

00:39:59.922 --> 00:40:02.376 to initiate this conversation and to

NOTE Confidence: 0.881755205714286

00:40:02.376 --> 00:40:05.558 ask patients. About their symptoms.

NOTE Confidence: 0.881755205714286

00:40:05.560 --> 00:40:07.898 So how are we doing radiation oncology?

NOTE Confidence: 0.881755205714286

00:40:07.900 --> 00:40:10.280 This is a abstract that was presented

NOTE Confidence: 0.881755205714286

00:40:10.280 --> 00:40:12.389 at Astro in 2022 looking at

NOTE Confidence: 0.881755205714286

00:40:12.389 --> 00:40:13.841 disparities in physician assessment

NOTE Confidence: 0.881755205714286

00:40:13.841 --> 00:40:15.717 of sexual dysfunction in women

NOTE Confidence: 0.881755205714286

00:40:15.717 --> 00:40:17.177 versus men receiving brachytherapy.

NOTE Confidence: 0.881755205714286

00:40:17.180 --> 00:40:19.100 Men population was prostate cancer,

NOTE Confidence: 0.881755205714286

00:40:19.100 --> 00:40:21.020 women population with cervical cancer.

NOTE Confidence: 0.881755205714286

00:40:21.020 --> 00:40:23.220 Among the prostate cancer patients

NOTE Confidence: 0.79437202

00:40:23.220 --> 00:40:25.140 90% had sexual function assessed.

NOTE Confidence: 0.79437202

00:40:25.140 --> 00:40:27.516 Among cervical cancer patients about 10%.

NOTE Confidence: 0.79437202

00:40:27.520 --> 00:40:29.375 So I think that unwittingly a lot

NOTE Confidence: 0.79437202

00:40:29.375 --> 00:40:30.958 of providers are in addressing

NOTE Confidence: 0.79437202

00:40:30.958 --> 00:40:32.778 sexual health with their patients,

NOTE Confidence: 0.79437202

00:40:32.780 --> 00:40:34.580 especially with their female patients.

NOTE Confidence: 0.79437202

00:40:34.580 --> 00:40:35.750 It's probably not on the.

NOTE Confidence: 0.79437202

00:40:35.750 --> 00:40:36.282 Providers, radar,

NOTE Confidence: 0.79437202

00:40:36.282 --> 00:40:38.144 it's not really part of our culture.

NOTE Confidence: 0.79437202

00:40:38.150 --> 00:40:40.136 I remember seeing this first hand

NOTE Confidence: 0.79437202

00:40:40.136 --> 00:40:41.867 as a resident understanding that

NOTE Confidence: 0.79437202

00:40:41.867 --> 00:40:43.587 patients are having these issues,

NOTE Confidence: 0.79437202

00:40:43.590 --> 00:40:45.510 but not really knowing how to address it,

NOTE Confidence: 0.79437202

00:40:45.510 --> 00:40:48.366 not being trained how to address it.

NOTE Confidence: 0.79437202

00:40:48.370 --> 00:40:50.134 So there's a lot of barriers

NOTE Confidence: 0.79437202

00:40:50.134 --> 00:40:52.152 to discussion and you can see

NOTE Confidence: 0.79437202

00:40:52.152 --> 00:40:53.720 here there's physician barriers,

NOTE Confidence: 0.79437202

00:40:53.720 --> 00:40:55.824 there's barriers on the patient side as well.

NOTE Confidence: 0.79437202

00:40:55.830 --> 00:40:56.886 And when you add these up,

NOTE Confidence: 0.79437202

00:40:56.890 --> 00:40:58.058 it's very, you know,

NOTE Confidence: 0.79437202

00:40:58.058 --> 00:40:59.518 becomes very difficult to talk

NOTE Confidence: 0.79437202

00:40:59.518 --> 00:41:01.250 about these issues in the clinic.

NOTE Confidence: 0.79437202

00:41:01.250 --> 00:41:02.918 And I think it's especially amplified

NOTE Confidence: 0.79437202

00:41:02.918 --> 00:41:04.610 in the female cancer population.

NOTE Confidence: 0.79437202

00:41:04.610 --> 00:41:06.634 But I think that one of the main

NOTE Confidence: 0.79437202

00:41:06.634 --> 00:41:08.696 reasons why doctors might not ask is

NOTE Confidence: 0.79437202

00:41:08.696 --> 00:41:10.929 because they might not know how to

NOTE Confidence: 0.79437202

00:41:10.929 --> 00:41:12.957 address the problems they might uncover.

NOTE Confidence: 0.79437202

00:41:12.960 --> 00:41:14.352 But the tragedy of that really

NOTE Confidence: 0.79437202

00:41:14.352 --> 00:41:15.920 is that there's a lot of very,

NOTE Confidence: 0.79437202

00:41:15.920 --> 00:41:18.328 very simple low tech tools that can

NOTE Confidence: 0.79437202

00:41:18.328 --> 00:41:20.180 really be available to everyone.

NOTE Confidence: 0.79437202

00:41:20.180 --> 00:41:21.980 So these are strategies to improve

NOTE Confidence: 0.79437202

00:41:21.980 --> 00:41:23.755 vaginal and sexual health and I

NOTE Confidence: 0.79437202

00:41:23.755 --> 00:41:25.575 would say they could be effective for

NOTE Confidence: 0.79437202

00:41:25.575 --> 00:41:27.460 probably about 80% of the types of

NOTE Confidence: 0.79437202

00:41:27.460 --> 00:41:29.140 symptoms that we see after radiation.

NOTE Confidence: 0.79437202

00:41:29.140 --> 00:41:31.372 So just some examples would be

NOTE Confidence: 0.79437202

00:41:31.372 --> 00:41:33.380 educating patients and giving them

NOTE Confidence: 0.79437202

00:41:33.380 --> 00:41:35.200 dilators to improve elasticity

NOTE Confidence: 0.79437202

00:41:35.200 --> 00:41:37.020 and present prevent adhesions.

NOTE Confidence: 0.79437202

00:41:37.020 --> 00:41:39.596 A lot of our patients have atrophy

NOTE Confidence: 0.79437202

00:41:39.596 --> 00:41:41.250 after radiating the pelvis,

NOTE Confidence: 0.79437202

00:41:41.250 --> 00:41:42.250 that hypo, estrogen and.

NOTE Confidence: 0.79437202

00:41:42.250 --> 00:41:43.500 Also fragility of the mucosa

NOTE Confidence: 0.79437202

00:41:43.500 --> 00:41:44.958 as a result of the radiation,

NOTE Confidence: 0.79437202

00:41:44.960 --> 00:41:46.800 the brachytherapy vaginal estrogen

NOTE Confidence: 0.79437202

00:41:46.800 --> 00:41:48.180 is very helpful,

NOTE Confidence: 0.79437202

00:41:48.180 --> 00:41:49.832 improving soreness and friction.

NOTE Confidence: 0.79437202

00:41:49.832 --> 00:41:51.897 Lots of education about lubricants

NOTE Confidence: 0.79437202

00:41:51.897 --> 00:41:53.880 and moisturizers or improving,

NOTE Confidence: 0.79437202

00:41:53.880 --> 00:41:54.580 you know,

NOTE Confidence: 0.79437202

00:41:54.580 --> 00:41:56.330 genito urinary symptoms of menopause

NOTE Confidence: 0.79437202

00:41:56.330 --> 00:41:57.380 or climacteric symptoms.

NOTE Confidence: 0.79437202

00:41:57.380 --> 00:42:01.228 A lot of our patients benefit from hormones.

NOTE Confidence: 0.79437202

00:42:01.230 --> 00:42:02.358 So in our practice,

NOTE Confidence: 0.79437202

00:42:02.358 --> 00:42:03.768 we recommend a comprehensive approach

NOTE Confidence: 0.79437202

00:42:03.768 --> 00:42:05.275 where the conversation starts before

NOTE Confidence: 0.79437202

00:42:05.275 --> 00:42:07.045 any treatments been given up front.

NOTE Confidence: 0.79437202

00:42:07.050 --> 00:42:08.835 We counsel patients about potential

NOTE Confidence: 0.79437202

00:42:08.835 --> 00:42:10.263 vaginal and sexual morbidity,

NOTE Confidence: 0.79437202

00:42:10.270 --> 00:42:11.398 quote incidence rates,

NOTE Confidence: 0.79437202

00:42:11.398 --> 00:42:12.526 discussed mitigation strategies

NOTE Confidence: 0.79437202

00:42:12.526 --> 00:42:14.030 and normalize the concern.

NOTE Confidence: 0.79437202

00:42:14.030 --> 00:42:15.166 During the radiation planning,

NOTE Confidence: 0.79437202

00:42:15.166 --> 00:42:17.110 we try to limit the vaginal dose

NOTE Confidence: 0.79437202

00:42:17.110 --> 00:42:18.050 as much as we can.

NOTE Confidence: 0.79437202

00:42:18.050 --> 00:42:19.758 Now we have guidelines from the embrace

NOTE Confidence: 0.79437202

00:42:19.758 --> 00:42:21.930 and others as to how to do this effectively.

NOTE Confidence: 0.79437202

00:42:21.930 --> 00:42:23.848 And then in terms of secondary prevention,

NOTE Confidence: 0.79437202

00:42:23.850 --> 00:42:25.786 a lot of the strategies that I showed

NOTE Confidence: 0.79437202

00:42:25.786 --> 00:42:27.410 you earlier recommending dilators,

NOTE Confidence: 0.79437202

00:42:27.410 --> 00:42:28.194 lubricants, moisturizers,

NOTE Confidence: 0.79437202

00:42:28.194 --> 00:42:30.154 screening patients for sexual concerns.

NOTE Confidence: 0.79437202

00:42:30.160 --> 00:42:32.626 Assessing vaginal and vulvar tissue quality,

NOTE Confidence: 0.79437202

00:42:32.630 --> 00:42:34.690 screening patients for menopausal symptoms,

NOTE Confidence: 0.79437202

00:42:34.690 --> 00:42:36.245 and referring our patients for

NOTE Confidence: 0.79437202

00:42:36.245 --> 00:42:37.489 further counseling and intervention,

NOTE Confidence: 0.79437202

00:42:37.490 --> 00:42:38.010 if warranted.

NOTE Confidence: 0.864862045

00:42:40.220 --> 00:42:41.642 So I'll mention here that education

NOTE Confidence: 0.864862045

00:42:41.642 --> 00:42:43.557 on this topic is an interest of mine,

NOTE Confidence: 0.864862045

00:42:43.560 --> 00:42:45.392 and I am a board member for an

NOTE Confidence: 0.864862045

00:42:45.392 --> 00:42:46.784 organization called the Scientific Network

NOTE Confidence: 0.864862045

00:42:46.784 --> 00:42:48.554 on female sexual health and cancer.

NOTE Confidence: 0.864862045

00:42:48.560 --> 00:42:50.128 So for those of you who are interested,

NOTE Confidence: 0.864862045

00:42:50.130 --> 00:42:51.710 the website is shown here.

NOTE Confidence: 0.864862045

00:42:51.710 --> 00:42:54.032 It has a lot of links to valuable resources,

NOTE Confidence: 0.864862045

00:42:54.040 --> 00:42:56.104 both for patients as well As for providers,

NOTE Confidence: 0.864862045

00:42:56.110 --> 00:42:58.135 so I'd encourage you all to take a look.

NOTE Confidence: 0.864862045

00:42:58.140 --> 00:42:59.144 And back in November,

NOTE Confidence: 0.864862045

00:42:59.144 --> 00:43:01.114 I hosted here at Yale the 8th

NOTE Confidence: 0.864862045

00:43:01.114 --> 00:43:02.320 annual scientific meeting,

NOTE Confidence: 0.864862045

00:43:02.320 --> 00:43:04.630 which drew almost 100 researchers

NOTE Confidence: 0.864862045

00:43:04.630 --> 00:43:06.478 from around the country.

NOTE Confidence: 0.864862045

00:43:06.480 --> 00:43:08.097 We are very lucky at Yale to

NOTE Confidence: 0.864862045

00:43:08.097 --> 00:43:09.230 have The Sims Clinic.

NOTE Confidence: 0.864862045

00:43:09.230 --> 00:43:10.700 So we realize that physical symptoms

NOTE Confidence: 0.864862045

00:43:10.700 --> 00:43:12.194 aren't the full picture and that

NOTE Confidence: 0.864862045

00:43:12.194 --> 00:43:13.592 sexual dysfunction can be a complex

NOTE Confidence: 0.864862045

00:43:13.592 --> 00:43:14.839 problem that has psychological,

NOTE Confidence: 0.864862045

00:43:14.840 --> 00:43:16.204 relational and cultural components.

NOTE Confidence: 0.864862045

00:43:16.204 --> 00:43:18.250 And the symptoms caused by radiation

NOTE Confidence: 0.864862045

00:43:18.300 --> 00:43:19.840 can compound already existing

NOTE Confidence: 0.864862045

00:43:19.840 --> 00:43:21.380 emotional and interpersonal issues.

NOTE Confidence: 0.864862045

00:43:21.380 --> 00:43:24.305 So one of this resource is The Sims Clinic,

NOTE Confidence: 0.864862045

00:43:24.310 --> 00:43:25.960 which was developed by Doctor

NOTE Confidence: 0.864862045

00:43:25.960 --> 00:43:28.140 Ratner and Doctor Minkin and has

NOTE Confidence: 0.864862045

00:43:28.140 --> 00:43:29.550 representation from Julianne,

NOTE Confidence: 0.864862045

00:43:29.550 --> 00:43:30.071 oncology,

NOTE Confidence: 0.864862045

00:43:30.071 --> 00:43:32.676 gynecology with specialization and menopause,

NOTE Confidence: 0.864862045

00:43:32.680 --> 00:43:34.300 as well as psychiatry and psychology,

NOTE Confidence: 0.864862045

00:43:34.300 --> 00:43:36.400 and they do a comprehensive evaluation.

NOTE Confidence: 0.864862045

00:43:36.400 --> 00:43:37.066 For our patients,

NOTE Confidence: 0.864862045

00:43:37.066 --> 00:43:38.398 we refer many of our patients

NOTE Confidence: 0.864862045

00:43:38.398 --> 00:43:39.509 there for their sexuality,

NOTE Confidence: 0.864862045

00:43:39.510 --> 00:43:40.800 menopausal and intimacy

NOTE Confidence: 0.864862045

00:43:40.800 --> 00:43:42.090 needs after brachytherapy.

NOTE Confidence: 0.864862045

00:43:42.090 --> 00:43:43.392 So I'm making a major plug

NOTE Confidence: 0.864862045

00:43:43.392 --> 00:43:44.260 for this wonderful program.

NOTE Confidence: 0.864862045

00:43:44.260 --> 00:43:45.235 And actually at the meeting

NOTE Confidence: 0.864862045

00:43:45.235 --> 00:43:46.610 that we hosted here in November,

NOTE Confidence: 0.864862045

00:43:46.610 --> 00:43:48.087 it was a pleasure to have a

NOTE Confidence: 0.864862045

00:43:48.087 --> 00:43:49.289 presentation from The Sims Clinic.

NOTE Confidence: 0.864862045

00:43:49.290 --> 00:43:52.328 I should mention that's also run by

NOTE Confidence: 0.864862045

00:43:52.328 --> 00:43:54.578 Johanna Diario and it's really one

NOTE Confidence: 0.864862045

00:43:54.578 --> 00:43:56.790 of the oldest programs in the world

NOTE Confidence: 0.864862045

00:43:56.857 --> 00:43:59.041 like this and has served as a model

NOTE Confidence: 0.864862045

00:43:59.041 --> 00:44:01.199 for many of the others to emulate.

NOTE Confidence: 0.864862045

00:44:01.200 --> 00:44:04.220 So with that, I'll end.

NOTE Confidence: 0.864862045

00:44:04.220 --> 00:44:05.940 We should be proud at Yale to have

NOTE Confidence: 0.864862045

00:44:05.940 --> 00:44:07.620 the resources that we need to treat

NOTE Confidence: 0.864862045

00:44:07.620 --> 00:44:08.825 our cervical cancer patients the

NOTE Confidence: 0.864862045

00:44:08.879 --> 00:44:10.383 best way that we can and to also

NOTE Confidence: 0.864862045

00:44:10.383 --> 00:44:11.835 help them live their lives the best

NOTE Confidence: 0.864862045

00:44:11.835 --> 00:44:13.279 way they can when treatment is done.

NOTE Confidence: 0.864862045

00:44:13.280 --> 00:44:14.680 So thank you for your attention and

NOTE Confidence: 0.864862045

00:44:14.680 --> 00:44:16.250 I'd be happy to take any questions.

NOTE Confidence: 0.9788471

00:44:25.460 --> 00:44:32.630 OK. Joe. So great, fantastic structure.

NOTE Confidence: 0.830584756

00:44:32.630 --> 00:44:35.290 So the the amount of

NOTE Confidence: 0.830584756

00:44:35.290 --> 00:44:37.230 personalization of therapy is.

NOTE Confidence: 0.683431980571429

00:44:39.430 --> 00:44:41.775 Unlike any other site for the treatment.

NOTE Confidence: 0.87823091

00:44:43.940 --> 00:44:46.184 And so I was just, I was just curious

NOTE Confidence: 0.87823091

00:44:46.184 --> 00:44:49.340 just to hear a little bit more about.

NOTE Confidence: 0.87823091

00:44:49.340 --> 00:44:51.800 How you work with the community?

NOTE Confidence: 0.87823091

00:44:51.800 --> 00:44:52.816 Because obviously we have

NOTE Confidence: 0.87823091

00:44:52.816 --> 00:44:54.086 all of these resources here,

NOTE Confidence: 0.87823091

00:44:54.090 --> 00:44:56.594 we have you here, you know, and you're

NOTE Confidence: 0.87823091

00:44:56.594 --> 00:44:58.179 instrumenting some of your patients,

NOTE Confidence: 0.87823091

00:44:58.180 --> 00:45:00.784 get treated a little bit in the

NOTE Confidence: 0.87823091

00:45:00.784 --> 00:45:02.720 Community and then come here.

NOTE Confidence: 0.87823091

00:45:02.720 --> 00:45:04.898 How do you negotiate that and

NOTE Confidence: 0.87823091

00:45:04.900 --> 00:45:08.620 how do you work with the with

NOTE Confidence: 0.87823091

00:45:08.620 --> 00:45:09.580 the outside referring Dr.

NOTE Confidence: 0.87823091

00:45:09.580 --> 00:45:10.268 to get that done?

NOTE Confidence: 0.752160644545455

00:45:10.660 --> 00:45:11.710 Yeah, I think that's a I

NOTE Confidence: 0.752160644545455

00:45:11.710 --> 00:45:12.800 think that's a great question.

NOTE Confidence: 0.752160644545455

00:45:12.800 --> 00:45:15.568 So, so I don't see myself as like

NOTE Confidence: 0.752160644545455

00:45:15.568 --> 00:45:17.277 a technician like philosophically

NOTE Confidence: 0.752160644545455

00:45:17.277 --> 00:45:20.097 I care for the whole patient.

NOTE Confidence: 0.752160644545455

00:45:20.100 --> 00:45:21.882 But I I also want to say that the

NOTE Confidence: 0.752160644545455

00:45:21.882 --> 00:45:23.797 good news is there are breaky

NOTE Confidence: 0.752160644545455

00:45:23.797 --> 00:45:24.793 therapists in Connecticut.

NOTE Confidence: 0.752160644545455

00:45:24.800 --> 00:45:26.494 I'm not the only breaky therapist in

NOTE Confidence: 0.752160644545455

00:45:26.494 --> 00:45:28.079 Connecticut and they do a wonderful job.

NOTE Confidence: 0.752160644545455

00:45:28.080 --> 00:45:30.444 So many patients are treated outside

NOTE Confidence: 0.752160644545455

00:45:30.444 --> 00:45:32.320 hospitals, but they also know these.

NOTE Confidence: 0.752160644545455

00:45:32.320 --> 00:45:33.892 Are referring doctors know that for

NOTE Confidence: 0.752160644545455

00:45:33.892 --> 00:45:35.698 patients that need a lot of needles,

NOTE Confidence: 0.752160644545455

00:45:35.700 --> 00:45:37.218 if it's a particularly big tumor

NOTE Confidence: 0.752160644545455

00:45:37.218 --> 00:45:39.244 or you know a vaginal that has

NOTE Confidence: 0.752160644545455

00:45:39.244 --> 00:45:40.829 a lot of vaginal involvement,

NOTE Confidence: 0.752160644545455

00:45:40.830 --> 00:45:42.382 they will send them up front to see

NOTE Confidence: 0.752160644545455

00:45:42.382 --> 00:45:44.247 me and I'll partner with them because.

NOTE Confidence: 0.752160644545455

00:45:44.250 --> 00:45:45.879 So I don't think I need to be treating

NOTE Confidence: 0.752160644545455

00:45:45.879 --> 00:45:47.319 all of the cases in Connecticut.

NOTE Confidence: 0.752160644545455

00:45:47.320 --> 00:45:49.203 But there are some cases that will

NOTE Confidence: 0.752160644545455

00:45:49.203 --> 00:45:50.533 really clearly benefit from needles

NOTE Confidence: 0.752160644545455

00:45:50.533 --> 00:45:52.185 and in general we don't want to

NOTE Confidence: 0.752160644545455

00:45:52.185 --> 00:45:53.369 split care between teams.

NOTE Confidence: 0.752160644545455

00:45:53.370 --> 00:45:55.260 So I think you know if there's one doctor

NOTE Confidence: 0.752160644545455

00:45:55.260 --> 00:45:57.307 that can do the whole thing start to finish,

NOTE Confidence: 0.752160644545455

00:45:57.310 --> 00:45:58.410 that's going to be better.

NOTE Confidence: 0.752160644545455

00:45:58.410 --> 00:46:00.410 There will be less delays and you'll get

NOTE Confidence: 0.752160644545455

00:46:00.410 --> 00:46:02.330 through that treatment time a lot quicker.

NOTE Confidence: 0.752160644545455

00:46:02.330 --> 00:46:03.506 And Umm, you know,

NOTE Confidence: 0.752160644545455

00:46:03.506 --> 00:46:05.270 so I think that when there's

NOTE Confidence: 0.752160644545455

00:46:05.339 --> 00:46:07.219 really no other effective way,

NOTE Confidence: 0.752160644545455

00:46:07.220 --> 00:46:08.536 I'm always happy to see the patient.

NOTE Confidence: 0.752160644545455

00:46:08.540 --> 00:46:09.849 I meet them up front and this

NOTE Confidence: 0.752160644545455

00:46:09.849 --> 00:46:11.208 is kind of our policy here.

NOTE Confidence: 0.752160644545455

00:46:11.210 --> 00:46:12.938 We always review their pathology here.

NOTE Confidence: 0.752160644545455

00:46:12.940 --> 00:46:14.812 We are part of the decision making up front.

NOTE Confidence: 0.752160644545455

00:46:14.820 --> 00:46:17.673 We do our own baseline exam and you know,

NOTE Confidence: 0.752160644545455

00:46:17.680 --> 00:46:19.000 because of resources and whatnot,

NOTE Confidence: 0.752160644545455

00:46:19.000 --> 00:46:21.000 I have to set up the OR times in advance.

NOTE Confidence: 0.752160644545455

00:46:21.000 --> 00:46:23.466 So I guess I see myself as a referral

NOTE Confidence: 0.752160644545455

00:46:23.466 --> 00:46:25.620 for the most complicated cases,

NOTE Confidence: 0.752160644545455

00:46:25.620 --> 00:46:27.318 but not for all the cases.

NOTE Confidence: 0.752160644545455

00:46:27.320 --> 00:46:28.510 Does that answer your question?

NOTE Confidence: 0.9273788

00:46:30.550 --> 00:46:30.900 Yes.

NOTE Confidence: 0.33403745

00:46:37.050 --> 00:46:37.580 Especially.

NOTE Confidence: 0.66968561

00:46:40.280 --> 00:46:43.418 You mentioned about it, you just,

NOTE Confidence: 0.66968561

00:46:43.420 --> 00:46:46.458 you know, place much under the R,

NOTE Confidence: 0.66968561

00:46:46.460 --> 00:46:51.080 so you place the Middle Ages or transcript.

NOTE Confidence: 0.83798109

00:46:52.690 --> 00:46:53.760 Oh, that's a great question.

NOTE Confidence: 0.83798109

00:46:53.760 --> 00:46:55.783 So, right. So the question is about

NOTE Confidence: 0.83798109

00:46:55.783 --> 00:46:57.838 real time image guidance of needles.

NOTE Confidence: 0.83798109

00:46:57.840 --> 00:46:58.869 So you're right.

NOTE Confidence: 0.83798109

00:46:58.869 --> 00:47:00.593 There are several, not a lot,

NOTE Confidence: 0.83798109

00:47:00.593 --> 00:47:01.979 but there are some institutions that

NOTE Confidence: 0.83798109

00:47:01.979 --> 00:47:03.320 have an expertise doing transrectal

NOTE Confidence: 0.83798109

00:47:03.320 --> 00:47:04.916 ultrasound and that is a very

NOTE Confidence: 0.83798109

00:47:04.967 --> 00:47:06.485 good modality to see where you're

NOTE Confidence: 0.83798109

00:47:06.485 --> 00:47:08.924 placing your needles in real time.

NOTE Confidence: 0.83798109

00:47:08.924 --> 00:47:11.699 And others do MRI's kind of

NOTE Confidence: 0.83798109

00:47:11.699 --> 00:47:12.977 like how we've been doing it.

NOTE Confidence: 0.83798109

00:47:12.980 --> 00:47:16.179 I think there's a, there's also a,

NOTE Confidence: 0.83798109

00:47:16.180 --> 00:47:16.800 what do you call it,

NOTE Confidence: 0.83798109

00:47:16.800 --> 00:47:18.310 like a learning curve with

NOTE Confidence: 0.83798109

00:47:18.310 --> 00:47:19.216 the transrectal ultrasound.

NOTE Confidence: 0.83798109

00:47:19.220 --> 00:47:21.500 So I tried it a couple of times,

NOTE Confidence: 0.83798109

00:47:21.500 --> 00:47:23.005 but I found that sort of placing

NOTE Confidence: 0.83798109

00:47:23.005 --> 00:47:24.279 the needles and going to MRI.

NOTE Confidence: 0.83798109

00:47:24.280 --> 00:47:25.508 Is effective for me,

NOTE Confidence: 0.83798109

00:47:25.508 --> 00:47:27.043 but there are practices that

NOTE Confidence: 0.83798109

00:47:27.043 --> 00:47:28.882 do the transrectal ultrasound

NOTE Confidence: 0.83798109

00:47:28.882 --> 00:47:30.355 with excellent results.

NOTE Confidence: 0.83798109

00:47:30.360 --> 00:47:33.100 Yeah, it's a good question.

NOTE Confidence: 0.83798109

00:47:33.100 --> 00:47:33.510 Yes.

NOTE Confidence: 0.881347094285714

00:47:46.320 --> 00:47:47.657 Yeah, they can do it pretty quickly.

NOTE Confidence: 0.881347094285714

00:47:47.660 --> 00:47:49.389 I don't recall in that particular case,

NOTE Confidence: 0.881347094285714

00:47:49.390 --> 00:47:51.820 but I think it's faster.

NOTE Confidence: 0.881347094285714

00:47:51.820 --> 00:47:53.236 So I would like to grow

NOTE Confidence: 0.881347094285714

00:47:53.236 --> 00:47:54.180 our 3D printing program.

NOTE Confidence: 0.881347094285714

00:47:54.180 --> 00:47:56.833 I think that's really an area for

NOTE Confidence: 0.881347094285714

00:47:56.833 --> 00:47:59.199 future development and a lot of promise.

NOTE Confidence: 0.881347094285714

00:47:59.200 --> 00:48:01.999 So, so like the like I mentioned at Stanford,

NOTE Confidence: 0.881347094285714

00:48:02.000 --> 00:48:03.358 they have an in House 3D printer

NOTE Confidence: 0.881347094285714

00:48:03.358 --> 00:48:04.420 within their own department.

NOTE Confidence: 0.881347094285714

00:48:04.420 --> 00:48:06.436 So they can do that very rapidly.

NOTE Confidence: 0.881347094285714

00:48:06.440 --> 00:48:08.870 I don't think it takes too much time to

NOTE Confidence: 0.881347094285714

00:48:08.870 --> 00:48:10.835 do but but we needed a couple of weeks.

NOTE Confidence: 0.881347094285714

00:48:10.840 --> 00:48:11.650 Just do it for sure.

NOTE Confidence: 0.9269076

00:48:15.070 --> 00:48:15.420 Yes.

NOTE Confidence: 0.6382878

00:48:17.980 --> 00:48:18.110 Yeah.

NOTE Confidence: 0.83442530375

00:48:35.410 --> 00:48:37.386 So I don't see Chris in the audience.

NOTE Confidence: 0.83442530375

00:48:37.390 --> 00:48:39.442 I think he he's done some

NOTE Confidence: 0.83442530375

00:48:39.442 --> 00:48:40.810 research into that question.

NOTE Confidence: 0.83442530375

00:48:40.810 --> 00:48:41.846 So the Mr. Lennox,

NOTE Confidence: 0.83442530375

00:48:41.846 --> 00:48:44.169 I think you can use to image your,

NOTE Confidence: 0.83442530375

00:48:44.170 --> 00:48:46.468 I think it is the right,

NOTE Confidence: 0.83442530375

00:48:46.470 --> 00:48:49.879 it is the right amount of magnetism

NOTE Confidence: 0.83442530375

00:48:49.879 --> 00:48:52.448 that you can image your implants well,

NOTE Confidence: 0.83442530375

00:48:52.448 --> 00:48:55.035 but I don't and I know one of our

NOTE Confidence: 0.83442530375

00:48:55.035 --> 00:48:57.051 physicists has sort of looked into that

NOTE Confidence: 0.83442530375

00:48:57.117 --> 00:48:59.365 but because we don't have an MRI linac,

NOTE Confidence: 0.83442530375

00:48:59.370 --> 00:49:01.128 so I haven't examined that too

NOTE Confidence: 0.83442530375

00:49:01.128 --> 00:49:02.995 extensively but I I think that

NOTE Confidence: 0.83442530375

00:49:02.995 --> 00:49:04.575 it would be compatible with

NOTE Confidence: 0.83442530375

00:49:04.575 --> 00:49:06.059 the majority of the MRI.

NOTE Confidence: 0.83442530375

00:49:06.060 --> 00:49:06.970 Safe applicators.

NOTE Confidence: 0.63740414

00:49:10.010 --> 00:49:13.286 Yes, look, look. Move forward

NOTE Confidence: 0.63740414

00:49:13.286 --> 00:49:15.650 to to new innovations and and

NOTE Confidence: 0.795162199411765

00:49:15.726 --> 00:49:18.715 new therapies as you know proton therapy.

NOTE Confidence: 0.838186886666667

00:49:21.160 --> 00:49:23.560 Do you think that that's another

NOTE Confidence: 0.838186886666667

00:49:23.560 --> 00:49:25.810 modality that you'll be able to?

NOTE Confidence: 0.838186886666667

00:49:25.810 --> 00:49:27.780 Used to produce side effects.

NOTE Confidence: 0.855835415

00:49:31.350 --> 00:49:35.560 Are there? Other sites that are using.

NOTE Confidence: 0.908873033333333

00:49:37.820 --> 00:49:40.160 So it's not not that common.

NOTE Confidence: 0.908873033333333

00:49:40.160 --> 00:49:42.496 I know that Doctor Lily Lynn at MD

NOTE Confidence: 0.908873033333333

00:49:42.496 --> 00:49:45.100 Anderson has the most experience using

NOTE Confidence: 0.908873033333333

00:49:45.100 --> 00:49:47.056 protons for gynecologic malignancies.

NOTE Confidence: 0.908873033333333

00:49:47.060 --> 00:49:48.368 But apart from that,

NOTE Confidence: 0.908873033333333

00:49:48.368 --> 00:49:51.140 I don't think it's been used that often.

NOTE Confidence: 0.908873033333333

00:49:51.140 --> 00:49:53.636 I don't think it'll replace brachytherapy,

NOTE Confidence: 0.908873033333333

00:49:53.640 --> 00:49:55.616 but in terms of whether it would be

NOTE Confidence: 0.908873033333333

00:49:55.616 --> 00:49:57.298 useful for for pelvic radiation,

NOTE Confidence: 0.908873033333333

00:49:57.300 --> 00:49:58.314 there's really not a lot of

NOTE Confidence: 0.908873033333333

00:49:58.314 --> 00:49:59.440 data about that at this point.

NOTE Confidence: 0.908873033333333

00:49:59.440 --> 00:50:01.016 I feel like when we start our program,

NOTE Confidence: 0.908873033333333

00:50:01.020 --> 00:50:03.253 we're going to be focused more on

NOTE Confidence: 0.908873033333333

00:50:03.253 --> 00:50:06.060 some of the more CNS type of and

NOTE Confidence: 0.908873033333333

00:50:06.060 --> 00:50:08.442 pediatric type of cases, but maybe.

NOTE Confidence: 0.908873033333333

00:50:08.442 --> 00:50:10.366 With with more research,

NOTE Confidence: 0.908873033333333

00:50:10.370 --> 00:50:13.526 we'll see if if that's helpful.

NOTE Confidence: 0.908873033333333

00:50:13.530 --> 00:50:14.962 So to be determined.

NOTE Confidence: 0.908873033333333

00:50:14.962 --> 00:50:17.110 But probably for reradiation cases I

NOTE Confidence: 0.908873033333333

00:50:17.177 --> 00:50:19.627 can imagine that would be very helpful.

NOTE Confidence: 0.88981545

00:50:22.220 --> 00:50:22.650 OK.