PROCEDURE

Partial breast brachytherapy

Partial breast brachytherapy delivers radiation inside the breast near the area where a tumour was removed.

PURPOSE
Reduce breast cancer recurrence near the lumpectomy site

PROCEDURE TYPE
Therapeutic - minimally invasive catheter-delivered internal radiation

WHERE IT IS DONE
Operating theatre and outpatient radiation clinic

ANAESTHESIA
Local, moderate sedation, or general for catheter placement

HOW LONG IT TAKES
Placement 30-60 minutes; radiation delivery 5-20 minutes

PREPARATION
Medication review; fasting if sedation or general anaesthesia planned

RECOVERY
Same day; no driving after sedation or opioid pain medicine

MAIN RISKS
Infection, bleeding, seroma, and skin or tissue injury

RESULTS
Treatment completion immediate; cancer control assessed during follow-up

Overview

Partial breast brachytherapy is an internal radiation treatment used after breast-conserving surgery, also called a lumpectomy. It treats the tissue closest to the place where the breast cancer was removed rather than the whole breast.

One or more narrow tubes, called catheters, are placed into the surgical area. Some systems use a balloon or expandable applicator with several treatment channels. A computer-controlled machine briefly moves a small radioactive source through these channels.

The source stays in each planned position for a precise amount of time. It is then returned to the machine. No radioactive material remains in your breast between sessions, so you are not radioactive around other people.

This treatment is one form of partial breast irradiation. Partial breast radiation can also be given from a machine outside the body.

Why the procedure is performed

Breast cancer can return in tissue close to the original tumour site. Partial breast brachytherapy delivers a concentrated radiation dose to this higher-risk area while limiting exposure to the rest of the breast, heart, lungs, skin, and ribs.

It may be offered after a lumpectomy for selected early-stage invasive breast cancers or ductal carcinoma in situ. Ductal carcinoma in situ, or DCIS, means abnormal cells remain inside the breast's milk ducts.

Treatment usually takes place over fewer days than traditional whole-breast radiation. The exact schedule is based on the applicator, radiation plan, and treatment centre.

Who should and should not have it

Partial breast brachytherapy is generally considered for people whose cancer has features suggesting a lower risk of disease elsewhere in the breast. These may include:

It is not suitable for everyone. Whole-breast radiation or another treatment may provide better coverage if cancer is found in several breast areas, the tumour is large compared with the breast, lymph nodes contain cancer, or surgical margins remain involved.

Treatment may also be avoided if the cavity is too close to the skin or ribs for radiation to be delivered safely. Previous radiation to the same area, pregnancy, certain inherited cancer risks, and some connective tissue disorders can affect the decision.

Applicator placement may be delayed because of an active infection, poor wound healing, unresolved pathology results, or a bleeding risk that has not been addressed. Your radiation oncologist will consider the cancer findings, breast anatomy, other health conditions, and your preferences.

- A small tumour confined to one area
- Clear surgical margins, meaning no cancer at the tissue's cut edges
- No cancer found in the lymph nodes
- Favourable findings from the laboratory examination of the tumour
- A lumpectomy cavity that can be safely reached and covered

How to prepare

Your treating facility's own instructions take priority because preparation differs with the placement method and type of anaesthesia.

Tell the team about all medicines, vitamins, supplements, allergies, implanted devices, and previous reactions to anaesthesia. Blood-thinning medicines can increase bleeding, but do not stop them unless the clinician responsible for your procedure tells you to.

You may need to stop eating and drinking before placement if you will receive sedation or general anaesthesia. Ask when to stop and which regular medicines to take that morning.

Wear loose clothing that opens at the front. Arrange for someone to take you home if you receive sedation or general anaesthesia. You may also need help at home while the applicator remains in place.

The team may use a mammogram, ultrasound, or CT scan to review the lumpectomy area. Final pathology results are usually checked before treatment planning.

What happens during the procedure

The applicator may be placed during lumpectomy surgery or through a small opening after you have recovered from surgery. Placement is usually guided by ultrasound or another imaging method.

After the area is cleaned, you receive local anaesthetic to numb the breast. Moderate sedation or general anaesthesia may also be used. The clinician positions a balloon applicator, expandable device, or group of catheters inside and around the lumpectomy cavity. A dressing holds the external part in place.

A CT scan is then used to map the cavity, skin, ribs, heart, and lungs. A radiation oncologist and medical physicist create a treatment plan that controls where the source stops and how long it remains there.

For each treatment, the applicator connects to a shielded machine called an afterloader. Staff leave the room during radiation delivery but can see, hear, and speak with you. The radioactive source travels through the channels and then returns to the machine.

You must stay reasonably still, but the treatment itself should not cause a sensation of heat or radiation. After the final session, the applicator is removed and the opening is covered with a dressing.

Recovery and what to expect afterward

Mild soreness, pressure, bruising, or pulling around the catheter site is common. Pain is usually greatest after placement and improves after removal. Use only the pain medicine recommended by your team.

You can usually eat normally once you are fully awake. If anaesthesia causes nausea, begin with fluids and light foods.

While the applicator is in place, keep the dressing dry and avoid pressure on the breast. Your team may restrict lifting, vigorous exercise, showering, or raising the arm on that side. Follow its instructions for sleeping and caring for the catheter.

Do not drive after sedation or general anaesthesia. You should also avoid driving while taking opioid pain medicine or if discomfort limits safe movement.

Many people return to desk-based work within a few days, although daily appointments and the external applicator may make work inconvenient. More physical work may require extra time. Fatigue can develop during treatment or in the following weeks.

Afterward, the breast may remain tender or swollen. Skin redness, dryness, temporary darkening, firmness, or a change in breast shape can develop over the following weeks or months.

Risks and possible complications

Applicator placement and radiation both have risks. Possible complications include:

Some changes appear months or years later. Your treatment plan is designed to limit radiation reaching healthy tissue, but it cannot remove every risk.

- Bleeding, bruising, or a collection of blood
- Infection at the catheter site or within the breast
- A seroma, which is a pocket of clear fluid
- Catheter movement or problems delivering the planned treatment
- Skin irritation, peeling, or a slow-healing wound
- Persistent breast pain, firmness, or swelling
- Fat necrosis, meaning a firm lump caused by damaged fatty tissue
- Changes in breast size, shape, colour, or texture

- Injury to nearby ribs, lung, or heart from radiation

Results and follow up

Brachytherapy does not usually produce an immediate test result. The important pathology results come from the tissue removed during lumpectomy. Those findings help determine whether partial breast treatment is appropriate.

Before you leave, you should receive instructions for dressing care, bathing, activity, and your next appointment. The team may check the site soon after applicator removal to look for infection, fluid buildup, or wound problems.

Later follow-up includes breast examinations and mammograms. The first post-treatment mammogram is often scheduled several months after radiation, with later imaging based on your treatment plan and local follow-up schedule.

Scar tissue and fat necrosis can affect how the breast feels or looks on imaging. Tell the team about a new or changing lump rather than assuming it is a treatment effect.

Alternatives

Whole-breast external beam radiation treats the entire breast without placing a catheter. It covers areas beyond the lumpectomy site but exposes more breast tissue and may involve more treatment visits.

External beam partial breast radiation also avoids an internal applicator. It directs radiation through the skin to a limited area, but the amount of surrounding tissue treated may be greater than with brachytherapy.

Intraoperative radiation gives one treatment during lumpectomy. It is convenient, but final pathology results may not yet be available. Some people need further surgery or radiation afterward.

Mastectomy removes most breast tissue and may reduce the chance of cancer returning in that breast. It is a larger operation, changes the breast permanently, and does not always remove the need for radiation.

For carefully selected people with favourable cancers, hormone treatment without radiation may be discussed. This avoids radiation but generally accepts a higher chance of cancer returning in the treated breast. Observation alone is appropriate only in limited situations after an individual discussion.

When to call your healthcare team

Contact your treatment team promptly if you develop increasing redness, warmth, swelling, or pain; pus or foul-smelling drainage; fever or chills; a soaked dressing; or an applicator that shifts or comes out. Do not try to reposition it yourself.

Routine mild bruising, tenderness, tiredness, and limited clear or pink drainage can occur. Mention symptoms that persist, worsen, or concern you at routine follow-up.

Seek emergency care for uncontrolled bleeding, severe shortness of breath, chest pain, fainting, or a severe allergic reaction. These are not routine recovery symptoms.

Common questions

Will I be asleep?

You may be awake with local anaesthetic, receive moderate sedation, or have general anaesthesia during applicator placement. Radiation sessions usually require no anaesthesia because they are not painful.

Can I drive home?

Not after sedation or general anaesthesia. Arrange a ride. You should also avoid driving while taking opioid pain medicine or if the applicator limits comfortable movement.

How painful is it?

Placement can cause pressure despite numbing medicine. Mild to moderate soreness afterward is common. Radiation delivery itself cannot usually be felt.

When will I know whether it worked?

There is no immediate result. The procedure's aim is to reduce the future risk of cancer returning. Your team monitors you over time with examinations and breast imaging.

Will I be radioactive?

No. The radioactive source is removed after every session. You can safely be around adults, children, and pregnant people between treatments.

How long does the applicator stay in?

It usually remains for the full treatment course, which may span several days. The schedule and removal timing are set by your treatment plan.

Sources

- American College of Radiology and Radiological Society of North America. "Brachytherapy." RadiologyInfo.org
- National Cancer Institute. "Breast Cancer Treatment (Adult) (PDQ®)-Health Professional Version"
- Shaitelman SF, Anderson BM, Arthur DW, and colleagues. "Partial Breast Irradiation for Patients With Early-Stage Invasive Breast Cancer or Ductal Carcinoma In Situ: An ASTRO Clinical Practice Guideline." Practical Radiation Oncology . 2024;14(2):112-132
- Vicini FA, Cecchini RS, White JR, and colleagues. "Long-term Primary Results of Accelerated Partial Breast Irradiation After Breast-Conserving Surgery for Early-Stage Breast Cancer: A Randomised, Phase 3, Equivalence Trial." The Lancet . 2019;394:2155-2164
- Strnad V, Polgár C, Ott OJ, and colleagues. "Accelerated Partial Breast Irradiation Using Sole Interstitial Multicatheter Brachytherapy Compared With Whole-Breast Irradiation With Boost for Early Breast Cancer: 10-Year Results of a Randomised Phase 3 Trial." The Lancet Oncology . 2023;24(3):262-272