PROCEDURE

Robotic surgery

Robotic surgery uses surgeon-controlled instruments to perform an operation, usually through small cuts.

PURPOSE
Treat disease or repair tissue with precise surgical instruments

PROCEDURE TYPE
Therapeutic, sometimes diagnostic; minimally invasive surgery

WHERE IT IS DONE
Operating theatre

ANAESTHESIA
General

HOW LONG IT TAKES
About 1-6 hours, based on operation complexity

PREPARATION
Fasting, medication review, and procedure-specific preparation

RECOVERY
Same day to several days; no driving after anaesthesia

MAIN RISKS
Bleeding, infection, organ injury, anaesthesia complications

RESULTS
Surgical findings immediately; laboratory results after several days

Overview

Robotic surgery is a form of surgery in which a surgeon controls robotic instruments from a nearby console. The system does not make decisions or perform the operation on its own.

Most robotic operations are minimally invasive, also called keyhole surgery. The surgeon works through several small cuts rather than one large cut. A camera provides a magnified, three-dimensional view inside your body. The robotic system translates the surgeon's hand movements into precise movements of small instruments.

Robotic systems are used in operations involving the prostate, kidneys, bladder, uterus, ovaries, bowel, chest, heart, and other areas. "Robotic surgery" describes the equipment and approach, not one specific operation. Your experience and recovery will be shaped mainly by the operation being performed.

Robotic surgery may allow smaller cuts and more precise movement in confined spaces. However, it is not automatically safer or more effective than standard keyhole or open surgery. The surgeon's experience and whether the approach suits your condition are important.

Why the procedure is performed

A robotic approach may be offered when you need an operation to remove, repair, or reconstruct tissue. Examples include removing a cancerous organ, repairing a hernia, removing the uterus, treating endometriosis, or operating on the bowel or heart.

The system may help a surgeon:

The reason for your operation should be discussed separately from the choice to use robotic equipment. Ask what benefit the robotic approach is expected to provide in your particular case and whether evidence shows an advantage over other methods.

- Work in a narrow or difficult-to-reach area
- See small structures through a magnified camera
- Move instruments with a wide range of motion
- Perform complex stitching through small cuts

Who should and should not have it

You may be considered for robotic surgery if you need an operation that can be performed safely through small cuts and an appropriately trained surgical team is available.

It may not be the right choice if open surgery would provide safer or more direct access. Some emergency operations are also better suited to open or standard keyhole surgery because treatment must begin quickly.

Robotic surgery may be avoided or delayed if you have an untreated infection or a medical problem that makes general anaesthesia unsafe. Some operations require your abdomen to be filled with carbon dioxide gas and your body to remain in a tilted position. Severe heart or lung disease may make this difficult to tolerate.

Previous operations, internal scar tissue, the location or size of a growth, and your body shape can affect whether a robotic approach is practical. These factors do not always rule it out, but they may increase the chance of changing to standard keyhole or open surgery.

If you are pregnant or could be pregnant, tell the surgical team. Whether surgery should

proceed will be based on its urgency, the type of operation, and the stage of pregnancy.

How to prepare

Your treating facility's own instructions take priority because preparation differs by operation and anaesthetic plan.

You will usually be told when to stop eating and drinking before general anaesthesia. Follow those times exactly. An operation may need to be delayed if your stomach is not empty.

Give the team a current list of your medicines, vitamins, supplements, allergies, and previous reactions to anaesthesia. Ask specifically about blood thinners like warfarin or apixaban , diabetes medicines, and weight-loss medicines. Do not stop a prescribed medicine unless the team responsible for your procedure tells you to do so.

Depending on the operation, preparation may include:

Tell the team if you become unwell before surgery, especially if you develop a fever, breathing illness, vomiting, diarrhoea, or a skin infection near the planned cuts.

- Blood tests, imaging, or heart and lung checks
- Bowel preparation before some bowel or pelvic operations
- Showering with a specified skin cleanser
- Removing jewellery, contact lenses, and nail products
- Arranging transport home and help during early recovery

What happens during the procedure

After you arrive, staff will confirm your identity, the planned operation, allergies, and consent. You will meet members of the surgical and anaesthesia teams. A small intravenous line will be placed in a vein for medicines and fluids.

General anaesthesia keeps you unconscious and prevents pain during the operation. A breathing tube is usually inserted after you are asleep.

The surgeon makes several small cuts and places hollow ports through them. A camera and surgical instruments pass through these ports. For abdominal surgery, carbon dioxide gas is often used to create working space.

The robotic system is then positioned beside you. The surgeon sits at a console and controls every instrument movement. Other team members remain beside you to monitor you,

exchange instruments, and assist with the operation.

Removed tissue may be sent to a laboratory for examination. At the end, the instruments are removed and the cuts are closed with stitches, surgical glue, or staples.

If the planned approach cannot be completed safely, the surgeon may switch to standard keyhole surgery or make a larger open cut. This is called conversion and is done to complete the operation safely.

Recovery and what to expect afterward

Pain is usually strongest around the cuts and the area that was treated. Abdominal surgery can also cause temporary shoulder discomfort from the carbon dioxide gas. You will be offered pain relief and may be asked to support your cuts when coughing or moving.

You may begin with sips of fluid and then return to food as your stomach and bowel recover. Some operations require a temporary special diet.

Gentle movement and short walks help circulation and bowel function. Avoid strenuous exercise and heavy lifting until your team says they are safe. Follow the wound-care and bathing instructions you receive.

Do not drive home after general anaesthesia. Arrange for a responsible adult to collect you. Do not drive again until you are no longer taking medicines that affect alertness, can move comfortably, and can perform an emergency stop. Your insurer or surgical team may have additional requirements.

Returning to work may take several days for a minor procedure or several weeks after major organ surgery. Physical work usually requires more recovery time than desk-based work.

Risks and possible complications

Robotic surgery has the risks of both surgery and general anaesthesia. Possible complications include:

The likelihood and importance of each risk are different for each operation. Ask about the risks that specifically apply to the body part being treated, your health, and the surgeon's experience with the procedure.

- Bleeding or the need for a blood transfusion
- Infection of a wound or a deeper surgical area

- Blood clots in the legs or lungs
- Injury to nearby organs, blood vessels, or nerves
- Breathing, heart, or medication-related anaesthesia problems
- Urinary, bowel, or sexual problems after certain operations
- Equipment problems or conversion to open surgery
- A hernia or persistent pain at an incision

Results and follow up

The surgeon can usually explain the main surgical findings soon after the operation, although you may not remember much while recovering from anaesthesia. It can help to have a trusted person present or ask for written information.

If tissue was removed, a pathologist examines it under a microscope. These laboratory results usually take several days and sometimes longer when special tests are needed.

Routine follow-up may check your cuts, recovery, pain, medicines, and return to normal activities. If the operation treated cancer, follow-up may also cover the final stage, whether further treatment is recommended, and plans for surveillance.

Keep routine appointments even if you feel well. Contact the team before your appointment if recovery is not progressing as described in your discharge instructions.

Alternatives

The alternatives are based on the condition being treated, not on the robot itself.

Standard laparoscopic surgery uses similar small cuts, but the surgeon holds the instruments directly. It may offer a similar recovery without robotic equipment, although some complex movements can be more difficult.

Open surgery uses a larger cut. It may provide faster or wider access and can be safer for some complex or emergency operations. It usually causes more wound pain and requires a longer recovery than minimally invasive surgery.

For some conditions, medicines, monitoring, radiation therapy, endoscopy, or image-guided treatment may avoid an operation. These options may involve less immediate recovery, but they may not remove or repair the problem as completely. Monitoring also carries the possibility that a condition will grow or worsen before treatment.

Ask what would happen if you delayed treatment or chose no treatment. Also ask whether the expected outcome would change if the same operation were performed without robotic equipment.

When to call your healthcare team

For routine questions about dressings, activity, diet, bowel movements, or returning to work, contact the surgical team during normal hours.

Seek prompt medical advice for worsening pain, repeated vomiting, increasing wound redness, pus, difficulty urinating, a swollen painful leg, or a fever at or above the threshold listed in your discharge instructions.

Seek emergency help for trouble breathing, chest pain, fainting, confusion, uncontrolled bleeding, or severe rapidly worsening pain. Use your local emergency number rather than waiting for a routine appointment.

Common questions

Will I be asleep?

Yes. Robotic surgery is normally performed under general anaesthesia, so you will be unconscious and will not feel the operation.

Can I drive myself home?

No. You must arrange a ride after general anaesthesia. Some operations also require an overnight hospital stay.

How painful is robotic surgery?

Small cuts may reduce wound pain compared with open surgery, but the operation inside your body can still cause significant discomfort. Pain varies with the procedure, and your team will provide a pain-control plan.

Is the robot doing the surgery?

No. The surgeon controls the camera and instruments throughout the operation. The system does not operate independently.

When will I know the results?

The surgeon may discuss the operation soon afterward. If tissue is sent for laboratory testing, complete results usually take several days.

Could I still need open surgery?

Yes. The surgeon may make a larger cut if there is heavy bleeding, difficult anatomy, internal scar tissue, or another concern that makes conversion safer.

Sources

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- MedlinePlus Medical Encyclopedia. Robotic surgery
- Mayo Clinic. Robotic surgery
- National Cancer Institute. Robotic surgery
- Muaddi H, Hafid ME, Choi WJ, and colleagues. "Clinical Outcomes of Robotic Surgery Compared to Conventional Surgical Approaches: A Systematic Overview of Reviews." Annals of Surgery . 2021;273(3):467-473.