



Nephrectomy

This information was produced by the European Association of Urology (EAU).

This leaflet contains general information about nephrectomy. If you have any specific questions about an individual medical situation you should consult your doctor or other professional healthcare provider.

The content of this leaflet is in line with the EAU Guidelines.

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Nephrectomy

What is nephrectomy?

Nephrectomy is the removal of a kidney. Nephrectomy can be cytoreductive, partial, or radical, depending on your situation.

Cytoreductive nephrectomy

Cytoreductive nephrectomy is recommended for kidney cancer patients whose cancer has spread to other tissue (metastatic). The goal of cytoreductive surgery is to remove as many cancer cells as possible. To do this, it may be necessary to remove surrounding organs as well. The spleen or the pancreas or parts of the intestines or the liver might be affected.

How is cytoreductive nephrectomy performed?

To undergo cytoreductive nephrectomy, you must be fit for surgery and have a tumour that can be removed. You will be asleep (general anaesthesia) during the operation. You will lie on your side or on your back, depending on the location and the size of the tumour. Cytoreductive nephrectomy is usually 'open', meaning that the surgeon will operate through an open cut (incision) in the body.

To begin, the tumour will be measured, and the doctor will see whether surrounding tissue or organs have been affected. Then the surgeon will cut the abdominal wall to access the kidney directly. To prevent the tumour from spilling cancer cells, the surgeon keeps the kidney covered with a protective layer of fatty tissue. The surgeon separates the tubes that connect to the kidney in order to remove it.

Cytoreductive partial nephrectomy

If the largest (primary) tumour in the kidney is not very large or if your other kidney is not working well, your doctor may recommend cytoreductive partial nephrectomy. This procedure is rarely done. The aim is to remove the part of the kidney with the tumour but to leave as much as possible of the healthy kidney tissue intact. This procedure can be done as open surgery or by making small cuts and inserting tube-like instruments that allow the surgeon to see inside the body (laparoscopy).

Metastasectomy

Your doctor may recommend additional surgery to remove the metastatic tumours. This is only advised if it is technically

possible to remove the metastases and if you are fit to undergo major surgery. This procedure can help if you are in a lot of pain or have other symptoms which cause discomfort.

How do I prepare for the procedure?

Your doctor will advise you in detail about how to prepare for the procedure. You must not eat, drink, or smoke for 6 hours before surgery to prepare for the anaesthesia. If you are taking any prescribed medication, discuss it with your doctor. You may need to stop taking it several days before surgery.

What are the side effects of the procedure?

After cytoreductive nephrectomy, you may have minor pain in the side of your body for several weeks.

You need to go to your doctor or go back to the hospital right away if you:

- Develop a fever
- Have any blood loss
- Experience acute pain
- Have blood in the urine

What is the impact of the treatment?

If cytoreductive nephrectomy is successful, it gives you the chance to live longer and you will have fewer side effects. After cytoreductive nephrectomy for kidney cancer, your doctor will generally recommend drug treatment.

What will the follow-up be like?

After cytoreductive nephrectomy for kidney cancer, your doctor will generally recommend drug treatment.

Partial nephrectomy

Partial nephrectomy is used to treat kidney cancer that has not spread to other tissue. It is recommended whenever possible. The aim is to remove the part of the kidney with abnormally growing cells (tumour) but to leave as much as possible of the healthy kidney.

How is partial nephrectomy performed?

You will be asleep (general anaesthesia) for partial nephrectomy. You will lie on your side or back during surgery, depending on the location and size of the tumour.

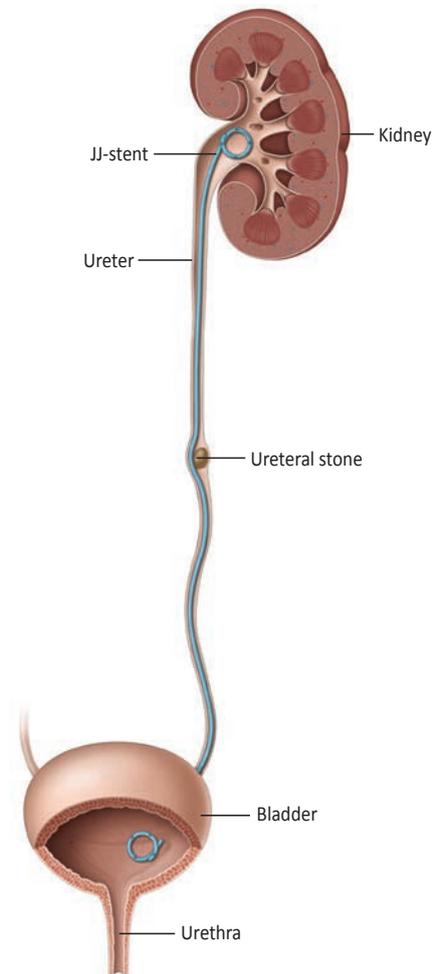
To begin, the exact location of the tumour is determined. Blood flow to the kidney could be temporarily stopped during the surgery to reduce blood loss and to have a better surgical view. This allows for the removal of the entire tumour. Crushed ice is sometimes used to lower the temperature of the kidney during the surgery to prevent damage from lack of blood flow.

After the tumour is removed, the surgeon will sew the wound closed and may apply medicine to stop further bleeding if necessary (Fig. 1).

If the tumour has invaded the collecting system of the kidney, the surgeon may need to place a double-J stent to make sure urine can flow through the urinary system (Fig. 2). The stent will be removed when your wounds have healed and urine flow is back to normal. This can take from several days to weeks.

Surgical approach

Partial nephrectomy can be performed two ways. The operation can be done through a cut in the abdominal wall to reach the kidney and the tumour directly (open surgery). It can also be done with tube-like instruments placed through



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Fig. 2: A JJ-stent is inserted to make sure urine can flow through the urinary tract.

small cuts to see inside the body (laparoscopic surgery) (Fig. 3). Laparoscopic surgery can also be done assisted by a surgical robot system.

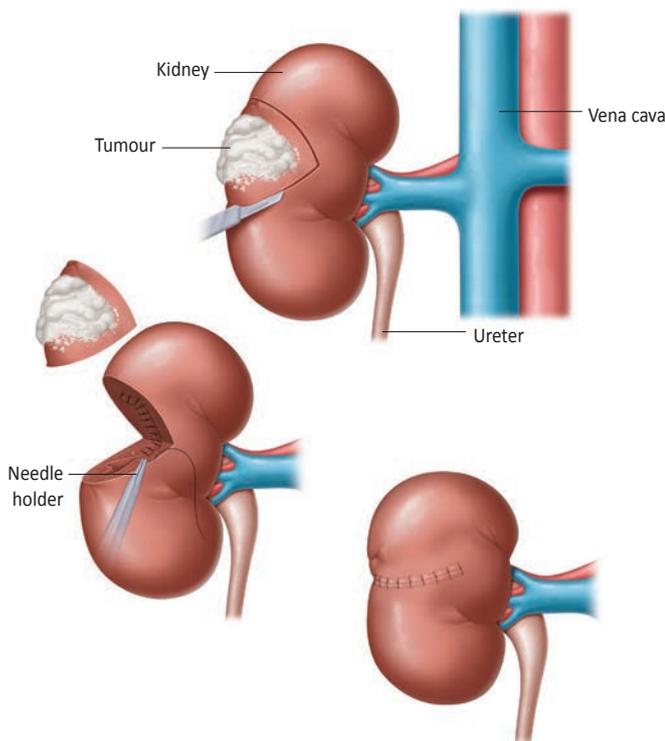
Both techniques are equally effective. Laparoscopic surgery generally leads to faster recovery than open surgery, but the technique is demanding and your doctor needs to have experience doing this type of surgery.

What are the side effects of the procedure?

Usually, you can leave the hospital between 3 and 7 days after surgery. Keep in mind that the length of hospital stay can vary in different countries. After open partial nephrectomy, you may experience some pain on the side of your body for several weeks.

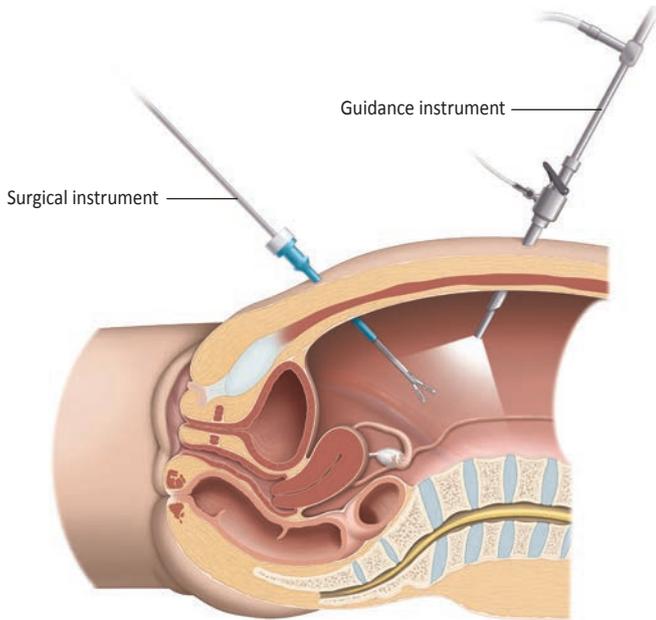
You need to go to your doctor or to the hospital right away if you:

- Develop a fever
- Have blood in the urine
- Have heavy blood loss or pain



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Fig. 1: In partial nephrectomy the tumour is removed, leaving as much as possible of the healthy kidney tissue.



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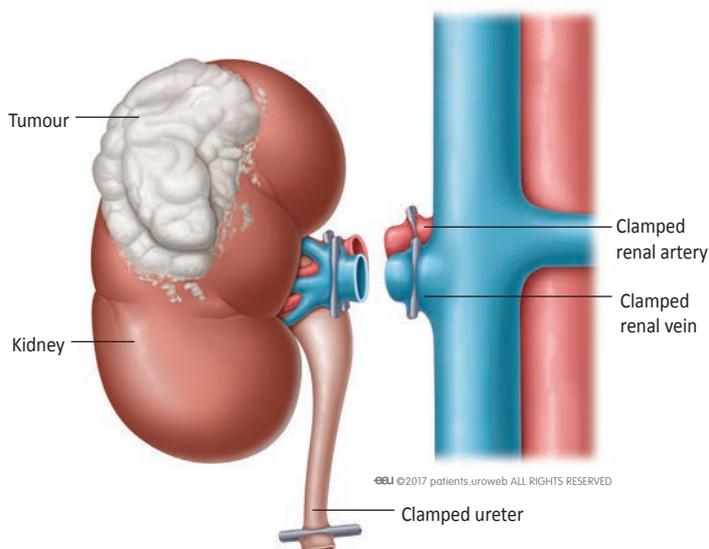
Fig. 3: For laparoscopic surgery the surgeon inserts the surgical instruments through small incisions in the abdomen.

What is the impact of the treatment?

Partial nephrectomy is a common procedure for kidney cancer that has not spread. Most patients remain cancer-free up to 5 years after this surgery. The benefit of having two functioning kidneys after surgery contributes to overall kidney function and general health.

What will the follow-up be like?

After partial nephrectomy for kidney cancer, your doctor will plan regular follow-up visits with you. How often these visits are needed depends on analysis of the removed tumour.



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Fig. 4: The tumour is removed together with the whole kidney.

Follow-up visits continue for at least 5 years. Common tests at follow-up visits are imaging of the abdomen (CT and ultrasound scans), chest x-ray, and urine and blood analyses.

Radical nephrectomy

Radical nephrectomy is the removal of the whole kidney and the surrounding fatty tissue. It is done when it is not possible to leave a functioning kidney behind after a partial nephrectomy. It is generally recommended for kidney cancers that have not yet spread but that have grown into surrounding tissue. It is also used for stage I tumours when partial nephrectomy is not an option. Most people can live with only one functioning kidney without major complications. How is radical nephrectomy performed?

You will be asleep (general anaesthesia) for radical nephrectomy. To begin, the size of the tumour is determined. To prevent tumour spillage, the surgeon keeps your kidney covered with a protective layer of fatty tissue. The surgeon then separates the renal artery, renal vein, and ureter from the kidney (Fig. 4). Finally, the kidney is removed.

Surgical approach

Radical nephrectomy can be performed two ways, and both are equally effective. The operation can be done through a cut in the abdominal wall to reach the kidney and the tumour directly (open surgery). It can also be done with tube-like instruments placed through small cuts to see inside the body (laparoscopic surgery) (Fig. 3). Laparoscopic surgery can also be done assisted by a surgical robot system.

Laparoscopic surgery generally leads to faster recovery than open surgery, but the technique is demanding and your doctor needs to have experience doing this type of surgery. Open radical nephrectomy may be recommended in certain medical cases or if laparoscopic surgery is not available in your hospital. The open approach has a longer recovery time, and there is higher risk of pain and complications after surgery compared with laparoscopy.

What are the side effects of the procedure?

Usually, you can leave the hospital between 3 and 7 days after surgery. The length of hospital stay can vary in different countries. You may experience minor pain in the side of your body for some weeks after open radical nephrectomy.

You need to go to your doctor or go back to the hospital right away if you:

- Develop a fever
- Have heavy blood loss or pain

What is the impact of the treatment?

Radical nephrectomy is a common procedure for kidney cancer that has not spread to other tissue. Most patients are cancer-free up to 5 years after surgery. Because you are left with only one functioning kidney, you have a higher risk of chronic kidney disease than if you had both. Reduced kidney function is also a risk factor for cardiovascular disease.

What will the follow-up be like?

After radical nephrectomy for kidney cancer, your doctor will plan regular follow-up visits with you. How often these visits are needed depends on analysis of the removed tumour. Follow-up visits will continue for at least 5 years. Common tests during follow-up visits are imaging of the abdomen (CT scans and ultrasound), chest x-ray, and urine and blood analyses.

* The cardiovascular disease terms are listed in the glossary.

Glossary of terms

Abdominal wall

The muscle and tissue that surrounds the abdominal cavity.

Anaesthesia

Medication administered before the start of a procedure to manage pain. Under general anaesthesia, you are unconscious and unaware of what is happening to you. Under spinal or local anaesthesia, you will not feel pain in the part of your body where the procedure is done. Anaesthesia wears off gradually after the procedure.

Cancer

Abnormal cell growth in the skin or organ tissue.

Cardiovascular disease

A disease involving the heart and the blood vessels.

Cytoreductive nephrectomy

Cytoreductive means reducing the number of tumour cells. This surgery is specific for metastatic kidney cancer. In this surgical procedure a tumour in the kidney is removed, while leaving distant metastases. The aim of the surgery is to reduce the total tumour cells in the body.

Fatty tissue

A type of connective tissue made of cells which store fat. Also called adipose tissue.

General anaesthesia

Use of drugs to make the patient unconscious and insensitive to pain.

Imaging

Taking images of the body with ultrasound, x-ray or other scanning techniques.

Kidneys

Two bean-shaped organs in the back of the abdomen that filter the blood and produce urine.

Laparoscopic surgery

A minimally-invasive surgical technique in which the surgeon does not need to cut through skin and tissue. Instead, the surgeon inserts the surgical instruments through small incisions in your abdomen.

Laparoscopy

A surgical procedure used to examine and operate the organs in the abdominal cavity.

Metastases

New sites in the body where cancer cells have spread to.

Partial nephrectomy

A surgical procedure in which a part of the kidney is removed.

Renal artery

The artery that carries a large portion of the blood flow that needs to be filtered to the kidneys.

Renal vein

This is the vein that carries the blood filtered by the kidney back into the body.

Surgical robot system

An instrument to help doctors perform laparoscopic surgery. The surgeon controls the robotic instrument with remote control sensors.

Tumour spillage

When tumour cells reach the blood or another organ during surgery. These cells may grow in a different location and develop into tumours.

Ultrasound

Use of sound waves to create an image of the body's inner workings.

Ureter

One of the two tubes through which urine flows from the kidneys to the bladder.

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