USEFUL INFORMATION FOR PATIENTS THAT HAVE BEEN DIAGNOSED WITH KIDNEY CANCER AND ARE ELIGIBLE FOR ROBOTIC PARTIAL/RADICAL NEPHRECTOMY

PROF. FRANCESCO MONTORSI

PROFESSOR AND CHAIRMAN
DEPARTMENT OF UROLOGY
PROGRAM DIRECTOR
VITA SALUTE SAN RAFFAELE UNIVERSITY - MILAN

Dear Patient,

After a careful evaluation of your case, you have been deemed eligible for robotic kidney surgery.

We are glad that, for your surgery, you have chosen our Department, where approximately 100 procedures for renal cancer are performed every year.

Additionally, in our research hospital we have conducted many studies (and many are ongoing) on what are the major determinants of postoperative outcomes of kidney surgery.

In a holistic approach, we have developed a path that begins before surgery and continues after.

We hope that this reinforces your trust in our Department and our Team and that these aspects reassure you.

In this document, we summarize essential information that will help to make your hospital stay, and subsequent complete recovery, as short as possible.

PRE-SURGICAL ASSESSMENT

Before surgery, your overall health status will be carefully evaluated and, in general, the following examinations will be performed or ordered:

- **Laboratory blood tests**
- **Electrocardiogram and cardiological examination**
- **Anesthesiologic assessment**, during which:

1. The suitability for surgery is ascertained
2. Additional exams or other physician evaluations may be ordered
3. Any changes in, or suspensions of, chronic therapies are agreed upon

- **Chest x-ray** (if the patient has not recently undergone a chest CT scan)
- **Optical exam with visual field**: this will be required only if the patient has severe myopia, has had a recent eye trauma or has uncontrolled glaucoma in the months before surgery.

These assessments are performed either in our hospital before admission or upon admission on the surgical ward.

We are glad to inform you that the need for blood transfusions is nowadays extremely low thanks to robotic surgery.
Yet, it is extremely important to inform us whether you are taking any anti-platelet or anti-coagulant ("blood thinners") medication. The suspension and/or replacement with other medications must be determined by your physician or by the anesthesiologist before surgery. These medications might increase the risk of intraoperative bleeding and their suspension or titration have to be carefully examined before surgery.

In some cases, it may be necessary to replace oral anti-coagulants ("blood thinners") with low molecular weight heparin (injections). The anesthesiologist or coagulation specialist from our hospital will advise you in this regard.
If you do not inform us on time about these medications and they

are subsequently not interrupted on time, the surgical procedure will have to be postponed, thus wasting precious time for your health!

A cardiological evaluation, in the 30 days prior to surgery is required.

PREPARING FOR SURGERY: TOWARD YOUR IDEAL WEIGHT

In order to facilitate the execution of the surgical procedure and to optimize outcomes in terms of complete removal of the tumor while preserving the anatomical structures responsible for urinary continence and erectile function, it is imperative that you reach a body weight that is as close as possible to your ideal one.

In the modern society, almost all patients are more or less overweight at baseline. A patient's weight category can be understood by his Body Mass Index (BMI).

If You have a BMI greater than 24.9 kg/m^2, it is advisable to schedule a nutritional consultation to set up a dietary plan ultimately aimed at reaching your ideal weight. Weight loss will determine greater technical ease in performing surgery, ultimately affecting both the short- and long-term outcomes!

Please, keep in mind that nutritional evaluations and treatments MUST always be personalized. Below is an example of an ideal low-calorie balanced diet for a 65-year-old patient who is 1.75 m tall and overweight.

Breakfast, about 15% of daily kcals	
Oat milk	150g
A cup of tea/coffee	60g/200g
Whole grain cereal	40g
Fruit jam without added sugars	25g
Fruit	150g
Snack, about 10% of daily kcals	
Walnuts or almonds	10g
Fruit	150g
Lunch, about 35% of daily kcals	
Pasta, rice or cereal Extra virgin olive oil Parmesan cheese	80g 10g 10g
Vegetables Extra virgin olive oil	200g 10g
Snack, about 10% of daily kcals	
Fruit	150g
Crackers, breadsticks, or whole grain croutons	25g
Dinner, about 30% of daily kcals	
White meat/fish Potatoes Extra virgin olive oil	150g/200g 150g 5g
Vegetables Extra virgin olive oil	200g 10g
Whole wheat bread	50g

We also recommend that you exercise regularly and, in particular, that you engage in at least 40 minutes of moderate aerobic physical activity every day.

Consult your physician relatively to this dietary advice, particularly if you suffer from diabetes or any cardiovascular disease.

A consultation with a Registered Dietitian (RD) is an integral part of our program for preparing patients for robotic surgery. This consultation must take place as soon as possible.

ANESTHESIA

The day before surgery, you must lead a normal life and eat as usual until the evening.
Robotic radical or partial nephrectomy is performed under general anesthesia. Pre-anesthesia medications will be administered before you are taken to the operating room, allowing the patient to feel calm and serene.
Simultaneously, intravenous administration of analgesic drugs (preventive analgesia) is started and will be continued through the post-operative setting for approximately 24 hours. Pain control at this point is generally optimal, allowing patients to quickly overcome the surgical trauma. The pain associated with robotic-assisted surgery is usually minimal, thanks to the absence of muscle incisions. In the postoperative setting, a slight muscle and joint pain may be felt due to the patient's position on the operating table, a problem easily resolved with analgesic drugs and early mobilization.
Rarely, in the first twenty-four hours after surgery, localized pain may arise in the shoulder blades. This pain is transitory and bears no consequences. It is generally due to presence of carbon dioxide, used to create the intra-operative pneumoperitoneum, in the pleural space.
A prophylaxis for nausea and vomiting is also administered during surgery to prevent any post-surgical discomfort. Yet, nausea and vomiting are rare after this type of minimally-invasive procedure.
The minimal invasiveness of this surgical technique usually allows patients to start drinking, eating and moving on the evening following surgery.
The prevention of thrombotic and thromboembolic phenomena is carried out with the use of elastic stockings placed on the lower limbs before surgery, by subcutaneous administration of low molecular weight heparin starting on the evening following surgery, and by early mobilization of the patient. Each of these procedures allow for the rapid recovery of patient's physical and

mental status, minimizing the consequences of surgical stress. The appropriateness of low molecular weight heparin injections is evaluated case-by-case according to the present guidelines for thromboprophylaxis.

The Consultation with our anesthesiology team is an important part of our pre-operative assessment and it must take place as soon as possible. It will be organized for you by our Urology admission office at San Raffaele Hospital.

SURGICAL TECHNIQUE

The various phases of surgery, described below, represent the standard surgical procedure. However, based on the patient's anatomy, the size and location of the tumour we may require some intra-operative modification to these steps.

The first surgical step consists in the creation of the pneumoperitoneum: the abdominal cavity must be filled with carbon dioxide to create a working chamber for the robotic surgical instruments.

An incision about 2 cm above the umbilicus allows for the placement of the first robotic trocar, which is done under direct vision, and serves to insert the small camera that the surgeon will use to operate. Other five operative trocars are then inserted into the abdominal cavity. Three of them are typically managed by the first surgeon and two by the surgical assistant.

Although it is an extremely rare occurrence, it is possible that the robotic trocars cannot be positioned due to the presence of numerous and tenacious intestinal adhesions and it is therefore necessary to change surgical approach, converting from robotic to

open surgery.

It is important to understand that the robotic technique provides the surgeon with a visual magnification of up to 20 times and a 3-dimensional vision. This allows the operator to appreciate the depth of the surgical field, which is not possible with the classic laparoscopic technique. The intraoperative robot-assisted vision helps the surgeon to see even the smallest anatomical detail and therefore to perform surgery with a significantly higher accuracy than the classical open or laparoscopic approaches.

After cutting the peritoneum, the surgeon enters the retroperitoneal space, where the kidney is located. The next step is the isolation of the kidney, by cutting the renal capsule formed by adipose tissue (Gerota fascia). The renal vessels (artery and vein) are subsequently isolated. After completing the isolation of the entire kidney surface, the tumour is identified. At that point, the renal artery is clamped in order to temporarily stop the kidney's blood flow, reducing intra-operative blood loss and allowing the surgeon an optimal visualization of the tissues. The interruption of blood flow to the kidney usually lasts less than 20 minutes. The surgeon then proceeds with tumour enucleation and resection (**partial nephrectomy**), with the concomitant removal of about 2-3 mm of apparently healthy renal parenchyma surrounding it.

Sometimes, the excessive size or location of the renal tumour does not allow to selectively remove the tumour. In these cases, to ensure for optimal cancer control, the removal of the entire organ (**radical nephrectomy**) is performed.

At the end of the surgery, a drainage tube is generally placed near the renal lodge. This is usually removed on the ward after 1-2 days, if no complications arise.

During the surgical procedure, a nasogastric tube is also placed to keep the digestive tract empty. The mobilization of the bowel and the concomitant general anaesthesia can generate a slowdown of the intestinal functions. Typically, the nasogastric tube is removed at the end of the surgery.

At the beginning of the surgery, a bladder catheter is also put in place. This allows constant monitoring of diuresis both during the surgery and in the first post-operative days, which is usually removed on the first or second post-operative day.

AS A GENERAL RULE, THE PATIENT MUST BE BEDRIDDEN FOR THE SHORTEST AMOUNT OF TIME!!!

The bladder catheter, which is placed during surgery, is kept in place for a period usually varying from 5 to 10 days, depending on the local intra-operative conditions and the post-operative course. On rare occasions, it may be necessary to keep the bladder catheter in place for a longer period of time, but generally no more than 3 weeks.

HOSPITALIZATION ON THE WARD MUST BE LIMITED TO THE MINIMUM LENGTH OF TIME IN ORDER TO REDUCE AS MUCH AS POSSIBLE THE RISK FOR PATIENTS TO CONTRACT A NOSOCOMIAL INFECTION!!

The patient who is discharged from the hospital with a drainage tube or bladder catheter will receive an appointment to return to our clinics after a few days to remove them.

Possible complications

Robotic renal tumour surgery is associated with intra- and post-operative complications in a low percentage of cases.

Intra-operative complications:

• Rare intra-operative bleeding may lead to radical nephrectomy, i.e. complete removal of the kidney (<5%)

• Rare profuse intra-parenchymal bleeding may require renal ischemia (by vascular clamping) for more than 30 minutes: this ischemia can lead to kidney damage and subsequent loss of renal function. This damage is particularly significant and irreversible in case of patients with a solitary kidney (<5%).
• Injury of the urinary excretory tract that must be identified, sutured, and protected by a ureteral stent ("Double J"), which will be removed about 30 days after surgery (<5%)
• Pancreatic and spleen lesions due to left kidney tumours, with possible splenectomy (<5%).
• In some cases, during surgery, the intra-operative situation makes it necessary to switch to open technique through an anterior abdominal or flank incision (<5%).

Post-operative complications:

• Urinary fistulas which may require ureteral stent placement ("Double J") (<5%).
• Anaemia due to kidney hematomas, which may necessitate blood transfusions and, in rare cases, the placement of a percutaneous drainage tube or re-intervention for haemostatic purposes (<5%).
• Arteriovenous fistulas with major bleeding which requires a percutaneous angiographic manoeuvre or in rare cases, surgery (<5%).
• Thromboembolic complications (<5%)
• Surgical re-operations in the post-operative period, due to complications of the surgery itself (<5%).
• Surgical intervention over time, due to disease progression (the percentage depends on the aggressiveness of the tumour disease).

Hospital Discharge Advice

At the time of discharge, our urologists will give you the provisional discharge letter (pending the final histological report), with the list of home therapies and discharge advice specific to your case. However, the following general rules are useful for optimizing your post-operative course.

Physical exertion and driving any type of vehicle is forbidden for at least 2 weeks after bladder catheter removal.

Nephrological follow-up

The kidneys perform various functions in our body, such as the production of urine, the regulation of blood pressure, the calcium-phosphorus metabolism, the acid-base and electrolyte balance and the production of erythropoietin. For these reasons, a patient who has had both nephrectomy or renal tumorectomy must be monitored over time to prevent changes in the mechanisms mentioned above, such as chronic renal failure, hypertension, metabolic acidosis, anaemia, electrolyte alterations, hyperparathyroidism and hypovitaminosis D. The patient needs to pay attention every time he undergoes radiological tests with iodinated contrast medium or takes nephrotoxic drugs (for example: NSAIDs).

Eating

You can resume your usual diet gradually and progressively. In the first month after surgery, it is important to drink at least one and a half litres of water per day; moderate alcohol consumption is acceptable. Diets high in protein and low in carbohydrates should be avoided.
To resume normal intestinal function, it is particularly important to vary the diet by enriching it with fresh and cooked fruit and vegetables (at least twice a day), in order to avoid constipation. It is very useful to drink 1 tablespoon of extra virgin olive oil during main meals.
The patient should try to have a bowel movement once a day, in order to avoid particularly hard stool formation that could cause difficulty in

defecation due to the need of consequent excessive abdominal thrusts – potentially harmful after surgery.

Physical activity

After being discharge from the hospital, you can gradually resume your physical activity. You can walk and go up and down the stairs. Driving the car can generally be resumed 3 weeks after surgery. However, remember to avoid strenuous activity such as lifting heavy objects or performing intense exercise for at least 4 weeks after the surgery. In fact, this is the time frame necessary for the developing of firm scar tissue both at the wound level and in the areas affected by the surgery. If you undergo strenuous physical activities earlier than necessary, the abdominal wall may be affected and become weaker, leading to the appearance of a hernia in the wound site.

Management of surgical wounds

The stitches of the small skin wounds are absorbable and do not generally need to be removed as they dissolve on their own. You can take a shower starting from the removal of the bladder catheter (bathing in the tub is allowed after about 10 days after surgery).
A tiny fraction of patients can develop a wound infection. This is manifested by the leakage of clear material (serum) or blood mixed with pus from the wound. Do not worry. You can be checked by your attending physician or come to our clinics. Always notify us of such a problem.

Abdominal pain

Abdominal pain is frequent but mild in intensity and it is present especially the day after surgery. It is generally due to the air in the bowels and/or the resumption of intestinal peristalsis (movement): it passes quickly with the return to normal intestinal activity and therefore in this phase the analgesics are useless, if not counterproductive. Please do not worry because everything will resolve itself

spontaneously. However, try to avoid those activities that encourage their onset.

Peri-renal or renal lodge hematoma

The onset of peri-renal or renal lodge haematoma may occur and generally manifests itself with fever and tiredness. Always notify us of a problem of this type, which requires urgent evaluation.

Deep vein thrombosis

During the first 4-6 weeks after surgery, deep vein thrombosis of the lower limbs may occur in about 1% of cases. The appearance of deep vein thrombosis can produce pain in the calf, ankle or leg swelling and it might be associated with a red and hot lower limb. Sometimes fever may appear. Although very rarely, these thrombi can detach and reach the lung causing a very serious condition called pulmonary embolism. Chest pain (especially after a deep breath), shortness of breath, sudden appearance of weakness and a sense of fainting are the main symptoms.
It is important to immediately recognize these signs and go to the emergency room. Always notify us of such a problem.

Infection of the urinary tract

They can happen when a bladder catheter is kept in place for a few days. It can manifest itself in various ways (burning after urination, cloudy and foul-smelling urine, fever, chills, etc.). If this happens, we recommend having a complete urine test and urine culture with an antibiogram and asking your doctor for any appropriate antibiotic therapy. Always notify us of such a problem.

Sediment in the urine

This can happen due to the leakage of old clots that were present in the bladder. The urine generally remains reddish for at least 15-20 days after the catheter is removed. Abundant hydration (drinking at least

1.5-2 litres of water per day) will help to make the urine clear. If you have difficulties during urination, please notify us immediately.

Final pathology examination

The final pathology examination of the tumour removed during the surgery usually becomes available in about 30 days. The pathological examination provides important information on tumour disease:

1. Histological type
2. Dimensions
3. Extension
4. Aggressiveness
5. Surgical margins (affected or negative).

The definitive pathological examination represents an essential element to define patient's prognosis, and to decide whether additional therapies are necessary. The patient will be called once the definitive histological examination is available. In addition, based on the report itself, the final discharge letter will be drawn up and delivered to the patient, including the follow-up checks (and any additional therapies) to be performed in the following months.

Follow up

As for future checks, we recommend carefully following the indications reported in the final discharge letter.

As mentioned above, subsequent check-ups (and any adjuvant therapies) will be set up based on the pathological report. If the disease was limited only to the kidney portion removed, you will be candidate for surveillance, based on the use of blood chemistry tests and instrumental investigations (ultrasound, radiograms, CT scan, MRI). Otherwise, all relevant information will be provided to you in the final discharge letter.

It is a great pleasure for me to have the chance to treat you. I hope you will always consider our entire medical staff as both doctors and friends.
While remaining at your complete disposal for any further clarification, I take this opportunity to offer you my best regards.

Prof. Francesco Montorsi

Professor and Chairman
Department of Urology
Program Director
Vita Salute San Raffaele University - Milan