General and Digestive Surgery Department

Hepatobiliopancreatic and spleen surgery area

Bile duct cancer

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**BILE DUCT CANCER**

1. **The bile ducts**

The bile ducts are a network of tubes that start inside the liver, then meet in another tube called choledochus with the cystic duct (that comes from the gallbladder) and finally, enters the duodenum.

The main function of the bile ducts is carrying bile from the liver, where it is produced, to the small bowel, where it mixes with food and helps digesting fats.

Most cancers are adenocarcinomas and they are formed in the covering of the bile ducts. Adenocarcinomas in the bile ducts are also called cholangiocarcinomas.

This condition can be classified into 3 groups depending on its location:

- Intrahepatic cholangiocarcinoma: it develops in the small bile ducts inside the liver.

- Hilar or Klatskin cholangiocarcinoma: it is located at the end of the bile ducts of the liver.

- Distal cholangiocarcinoma: they are located in the choledochus near the area and in the area surrounding the end part that connects with the intestine. Its location is very relevant because the symptoms and the treatment depend on it.

2. **Risk factors**

The exact cause for bile duct cancer is unknown, although certain risk factors have been identified. Among them we can list: sclerosing cholangitis, ulcerative colitis, bile duct calculi, age (as in most cancers, it is more frequent in patients over 65) and strange illnesses such as polycystic liver, Caroli disease (congenital dilation of the bile ducts inside the liver) or Clonorchis sinensis infections (a parasite that is frequent in food and water in certain Asian countries).

All these factors can harm the DNA- genetic material that contains all the necessary information for the control of chemical processes in our body- and provoke mutations that modify the control over cellular growth and may cause a chaotic multiplication of them.
3. Symptoms

They frequently appear in a late stage of the condition. You must consult a surgeon about any of these symptoms:

- Jaundice: the yellow pigmentation of the skin or the eyes with darker urines and light-colored faeces. It is caused by the accumulation in blood of a pigment called bilirubin which is normally eliminated with the bile, going from the liver to the intestines through the bile duct. A tumor located in this duct can block the normal bile flow. However, there can be jaundice in other benign illnesses such as hepatitis or choleliths (bodies formed in the gallbladder).

- Itching: due to the accumulation of substances in the skin that are normally eliminated with the bile. It is normally associated to a yellowish colour of the skin.

- Tiredness, loss of appetite, and unjustified weight loss.

- Pain: normally located in the upper part of the abdomen. Usually, this symptom appears at a late stage.

4. Diagnosis

Sometimes it is not easy to diagnose it, especially in early stages because the symptoms are not very clear. All the tests that the patient undergoes are orientated towards the diagnosis of the condition and its staging in order to choose the most adequate treatment.

Among all these tests, we include:

- Complete blood analysis, including "oncogene markers", this is, the level of certain substances in blood that determine the presence of malignant bile duct tumors.

- Abdominal ultrasonography: sound waves are released against the tissue to form "echoes" that create an image on the screen. Thanks to this painless technique, the experts can obtain valuable information about the liver, locate the dilated area in the bile ducts and the rest of abdominal organs.

- Computed tomography (CT): this procedure obtains high resolution images from different slices of the body and permits the two or three dimensional reconstruction of any part of the body.

- MRI (magnetic resonance imaging): this technique uses magnetic fields and radio frequency waves to obtain detailed images of the different parts of the body. Similarly to CT, we can inject contrasts intravenously in order to obtain clearer images of certain organs when proceeding with a MRI.

There is a new MRI technique called cholangio-MRI that permits obtaining a two or three dimensional image of the bile ducts and locating the exact point in which the tumor obstructs the flow.
CT and NMRI are the main tests performed to diagnose this type of tumors. They permit knowing the exact location of the tumor and if there is distant dissemination (metastasis).

- **PET (positron emission tomography)**: a substance derived from glucose is injected in vein and is marked with a radioisotope. The device rotates around the body and takes photographs of the areas of the body that use more glucose. Tumor cells are more active and consume more glucose, so they are highlighted in the images.

- **PET-CT**: it is a state-of-the-art technology that combines both techniques and allows an exact location of the original tumor and the distant metastasis.

- **Endoscopic retrograde cholangiopancreatography (ERCP)**: a flexible tube with a light (endoscope) is introduced through the mouth to the duodenum and localizes the "papilla" (a hole where the bile and the pancreas duct meet). A contrast is then introduced and allows checking for any tumors of obstructed areas.

Biopsies can be taken in the process as well as the placement of a small plastic tube (stent) in order to relieve the obstruction and improve the bile flow as well as the itching and jaundice.

- **Endoscopic ultrasonography**: an endoscope with a small ultrasound device is used, and therefore it is possible to have a detailed ultrasound image of the bile duct, the liver and the nearby organs through the stomach wall or the duodenum. It also permits detecting small injuries that would normally pass unnoticed and even taking samples of suspicious tissue that can be later examined with a microscope (biopsy).

- **Transparietohepatic cholangiography (CTPH)**: the liver is punctured with a needle going through the skin and the ribs. A contrast is then introduced and the X-ray draws the map of the bile ducts. If an obstruction area is found, a catheter can be placed there in order to permit bile flow, whether to the intestine or to an external pouch.

- **Laparoscopy**: this test is done in the operating room under general anesthesia. The surgeon performs a 1-2 cm incision in the abdominal wall, introduces an optic device (laparoscope) that is connected to a camera and obtains a magnified image of the inner organs of the patient. Biopsies can be taken at this point and also it is possible to see if the tumor has extended to other organs.

**5. Treatment**

Once all these tests are assessed, we can plan the most adequate strategy depending on the stage and the general state of the patient. There are three main treatments, although it is frequently necessary to combine several techniques.

1. **SURGERY** under two circumstances:

   a) **If the tumor can be removed (curative surgery)**: it is an aggressive and complex surgery that must be carried out only by surgeons specifically trained in the field.
The type of intervention depends on the location of the tumor.

- **Intrahepatic cholangiocarcinoma**: it requires removing part of the liver. It is necessary to study very carefully the remaining part of the liver that will stay after the intervention in order to ensure its correct functioning. If the area that needs to be removed is greater than what the patient can cope with, it will be necessary to apply other methods prior to the intervention that help the healthy section of the liver grow.

- **Hilar cholangiocarcinoma or Klatskin tumor**: this is the most frequent of all malignant bile duct tumors. It is necessary to remove part of the liver, the gallbladder, the bile duct, and all surrounding lymph nodes.

- **Distal cholangiocarcinoma**: in this case, we need to resect the head of the pancreas, part of the stomach, duodenum, gallbladder, bile ducts, and regional lymph nodes.

After this type of intervention, the patient must stay 24-48 hours in ICU (intensive care unit) and in hospital for approximately 2 weeks. The recovery at home depends on each case, but it normally takes 1-2 months to have normal activity.

**b)** When the tumor has disseminated and it is not possible to totally remove it, it might be necessary to operate the patient (**palliative surgery**) in order to relieve the symptoms and perform bile derivations (bypasses that avoid the obstructed area of the bile duct) that allow the bile flow to another area of the digestive tract.

Nowadays and thanks to diagnostic imaging techniques, very few patients need this type of intervention. Doctors can place metallic prosthesis (stents) in the obstructed duct so that they can relieve the bile flow and improve the symptoms.

**2. RADIOTHERAPY**

This treatment uses different types of radiation to destroy tumor cells. The radiation can be delivered externally with a device that irradiates from outside the body, or internally, using devices (needles or catheters with a sealed radioactive substance inside) that are introduced inside or near the tumor. Under certain circumstances, it may be necessary to apply radiation during the operation. For that purpose we use an operating room specifically designed for this.

**3. CHEMOTHERAPY**

Medicines are used in order to destroy cancerous cells and therefore avoid their growth. They can be administered in two ways:

- **Systemic chemotherapy**: anti-cancer drugs are taken orally or intravenously.

- **Regional chemotherapy**: they require a small intervention in which the artery that takes blood to the liver is localized. Then, an externalized catheter is placed in this artery and the medicines can be administered directly using this catheter.
into the organ where the tumor is. Thus, the side-effects that these drugs have in other organs can be reduced. Sometimes it is necessary to combine chemotherapy and radiotherapy so that tumor cells are more sensitive to radiation and therefore the recurrence of the condition in other parts of the body can be avoided.

6. Prognosis

The prognosis (life expectancy) after the treatment for a bile duct tumor depends on the following facts:

- The possibility of a total removal with surgery.
- The stage of the cancer, which can be established under three parameters: size of the tumor, affection of lymph nodes, and distant organs.
- Health condition of the patient.
- The existence of recurrences (reappearance of the illness in the surgical area or in distant organs).

Bile duct cancer can be controlled only if it is detected before its dissemination, and can be removed in a surgical operation. If it is extended, the treatment can only be palliative (it can only improve the patient’s quality of life, controlling the symptoms and the complications that may occur).

7. Checkup

Once the patient is discharged, the medical team must schedule a series of checkups that will need complete analysis and normally one or two imaging tests (CT, NMRI or PET-CT) in order to know the evolution of the condition.

8. Adapting to living with gallbladder cancer

This condition changes the life of the patient and their relatives. Many questions will rise in terms of treatment, secondary effects, quality of life, evolution... The professional team responsible for each case is the most adequate to answer these questions, and they can suggest and find help groups, psychological aid and any other related resources. A new lifestyle must be assumed:

- Avoiding tobacco and alcohol.
- Moderate physical exercise 3 days a week will improve their cardiovascular state, reduce fatigue, and reduce anxiety levels.
- As long as it is possible, return to their normal work or at least to the tasks that are more enjoyable to them.
- Following an adequate diet: after the intervention and during the radio or chemotherapy it is very frequent to suffer nausea, loss of appetite, and loss of weigh. It will be very helpful to eat less amount of food but more often (5 times a day)
with a diet rich in fruit, vegetables and carbohydrates, and avoiding fats.

Nobody can change the fact that the patient suffers this illness, but at least the way to face it is. This recommendation can make the patient feel better physically and emotionally.
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