### About the Whipple Procedure in MEN1

#### What is the pancreas?

The pancreas is a gland that lies at the back of the upper abdomen, behind the stomach. It is shaped like a tadpole; the globular head lies attached to the duodenum (a part of the intestine that forms the outlet of the stomach), while the body and tail of the pancreas extend across to the left side. The pancreas produces digestive juices which mix with bile in the intestine to help us to digest our food, as well as hormones to control sugar levels in the blood (blood sugar levels). Some hormones (the body’s chemical messengers) produced by the pancreas are:

- **insulin**, which lowers blood sugar levels;
- **glucagon**, which raises blood sugar levels;
- **gastrin**, which increases the amount of acid in the stomach and can cause stomach ulcers if left undetected; and
- **somatostatin**, which has effects on the local release of insulin and glucagon.

![Pancreas diagram](image)

### Types of Pancreatic Tumour That May Occur in MEN1

<table>
<thead>
<tr>
<th>TYPE OF TUMOUR</th>
<th>ACTION OF TUMOUR</th>
<th>POSSIBLE SYMPTOMS</th>
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<tbody>
<tr>
<td>Non-Functioning</td>
<td>Do not appear to overproduce any hormones</td>
<td>None</td>
<td>Most common MEN1 pancreatic tumour. Gastrinomas can also occur in the gut (duodenum).</td>
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<tr>
<td>Somatostatinomas</td>
<td>Overproduces the hormone somatostatin which curbs the actions of many hormones</td>
<td>Severe diarrhoea and formation of gallstones</td>
<td>Very rare tumour referred to as being Verner-Morrison syndrome. Only reported in a few MEN1 patients.</td>
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<td>Overproduces the hormone insulin</td>
<td>Sweating and faintness due to low blood sugar levels (hypoglycaemia)</td>
<td>Usually located in the tail (end) of the pancreas.</td>
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<td>Glucagonomas</td>
<td>Overproduces the hormone glucagon</td>
<td>Skin rash and high blood sugar levels (hyperglycaemia)</td>
<td>Very rare tumour referred to as being Zollinger-Ellison syndrome.</td>
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<td>Overproduces the hormone gastrin</td>
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<tr>
<td>VIPomas</td>
<td>Overproduces the pancreatic protein, vasoactive intestinal peptide</td>
<td>Severe diarrhoea and formation of gallstones</td>
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VIPomas: Very rare type of tumour whose effects are referred to as being Zollinger-Ellison syndrome. Only reported in a few MEN1 patients.
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**What is the pancreas?**

The pancreas is a gland that lies at the back of the upper abdomen, behind the stomach. It is shaped like a tadpole; the globular head lies attached to the duodenum (a part of the intestine that forms the outlet of the stomach), while the body and tail of the pancreas extend across to the left side. The pancreas produces digestive juices which mix with bile in the intestine to help us to digest our food, as well as hormones to control sugar levels in the blood (blood sugar levels). Some hormones (the body’s chemical messengers) produced by the pancreas are:

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What is A Whipple’s Procedure?

In the Whipple operation the head of the pancreas, a portion of the bile duct, the gallbladder and the duodenum are removed, usually with part of the stomach. After removal of these structures, any remaining pancreas, the bile duct and stomach are rejoined to the intestine. This allows pancreatic juice, bile and food to flow back into the gut, so that digestion can proceed normally. The operation typically lasts for 4-7 hours.

When is it done?

Tumours of the pancreatic islet cells occur in up to 75% (3 in 4) of MEN1 patients, and up to half of these have the tendency to become malignant if left untreated. However, it remains uncommon for patients with MEN1 to require the Whipple operation, especially as tumours that need to be removed are commonly found in the body or tail of the pancreas, and so can be treated with a distal pancreatectomy (this can often be performed as a minimally invasive operation using keyhole surgery). It is only when tumours are in the head of the pancreas that the Whipple operation may be necessary, though it is not required for all types of tumours, e.g. non-functioning tumours smaller than 20mm can usually be left untreated.

When a patient presents with tumours along the length of the pancreas, there is often the need for a discussion about the advantages of a more extensive operation compared to other less radical operations. The latter, while leaving some tumours untouched, will minimise the risk of diabetes. Even if another operation is needed in the future, this may allow patients to avoid the associated downsides of major open surgery and diabetes for the majority of their young adult life.

Nevertheless, it is important to note the unpredictable nature of MEN1 tumours. Gastrinomas in particular may sometimes turn cancerous (malignant) and spread if left undetected or untreated. The exact problem in your case may not be clear, and you may be advised to undergo surgery on the suspicion of cancer.
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What alternative treatments are available?

There are a small number of experimental treatments, such as destroying tumours by heat (ablation), injection or ultrasound waves (HIFU), but these cannot routinely be recommended as they have not proven successful. If you require the operation for cancerous tumours, having chemotherapy first may be able to help to shrink them or delay their growth. However, at present, no treatment other than timely and appropriate surgery is able to cure this problem.

What are the benefits of surgery?

Patients with MEN1 develop neuroendocrine tumours (NETs), which, if they turn cancerous, are slower to grow and spread compared to typical pancreatic cancers. However, once these tumours do spread, they are usually incurable. In MEN1 patients with metastatic pancreatic or gastrointestinal tumours, life expectancy may be 10 to 20 years shorter than the average population. As such, a major effort is made to identify and remove tumours that are at risk of spreading, hence the specialist care and annual MRI scans that most patients need. When a tumour is removed without it having spread before surgery, the long-term prognosis (outlook) is much better. However, patients with MEN1 will always be at a greater risk of tumours returning in any part of the pancreas that remains after an operation. If you wish, your surgeon can discuss the likely outcomes in your case.

Even with benign (non-cancerous) tumours of the pancreas, your quality of life can be greatly improved if you have hormone-secreting tumours removed. Depending on the type of tumour you have, a successful operation should relieve symptoms such as stomach ulcers, hypoglycaemia (low blood sugar), or gallstones, as well as reduce the chances of your tumours spreading in the future.

What are the risks and possible complications?

The Whipple operation is a major procedure with possible associated risks and complications. However, these days the operation has become much safer. At specialised centres where a large number of these operations are performed by selected surgeons, at least 19 in 20 patients will survive the operation.

Possible complications include:
• those related to general anaesthesia and the epidural;
• chest infection and problems with breathing;
• bleeding during or after the operation, which may result in blood transfusion;
• wound infection;
• blood clots forming in the legs.
• Anastomotic leak (1 in 10 patients): after the tumour is removed, the cut ends of the pancreas, bile duct and stomach are sewn back onto the intestine. In some patients,
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these stitches may not heal well. If this happens then pancreatic juice or bile may leak into the abdomen. Your surgeon will leave a drain tube in the abdomen in order to identify and remove any leakage of these fluids after the surgery. In most patients who develop leakage after the surgery, the leakage heals on its own, though some patients need to be re-operated on for this complication. People with MEN1 are somewhat more likely to have such a leak as patients with a normal, soft pancreas and an undilated pancreatic duct (typical of MEN1, but not of other pancreatic cancers) are more likely to suffer from post-operative leaks.

• **Delayed emptying of the stomach** (1 in 10 patients): after the surgery, you will be provided with fluids through a drip into your vein, and liquid food via a feeding tube.

You will not be allowed to eat or drink until your bowel function has returned. This usually takes 6-7 days. In some patients, the stomach may take a longer time to recover after surgery. During this period, they may not be able to tolerate food well, and may need continued tube feeds for several weeks.

**What anaesthetic will I have?**

The normal anaesthetic technique for this procedure is a combination of general and epidural anaesthesia. During general anaesthesia you are put completely to sleep and a tube is put into your windpipe, so it is not uncommon to get a sore throat after the operation. During this period, they may not be able to tolerate food well, and may need continued tube feeds for several weeks.

The epidural is a way of blocking the nerves that supply the area of the operation. An epidural is a fine tube that the anaesthetist will place in your back, next to the spinal cord nerves, before you go to sleep with the general anaesthetic. It remains in place for 3-5 days after the operation. The tube is very fine so that you can lie on your back. The epidural helps you to breathe deeply, which would be very difficult to do if you were in a lot of pain. You will also be able to sit and walk with the epidural in place. The epidural is very safe. The chance of any permanent nerve damage from an epidural is very rare, less than 1 in 10,000.

You will be given a PCEA (Patient-Controlled Epidural Analgesia) button to control the amount of painkiller that you get. You can press the button whenever you need more pain relief, and a computerised pump will deliver it from a syringe into the epidural. The pump is designed to prevent an overdose, so for a few minutes after one dose, it will not deliver another dose.

Your anaesthetist is also responsible for replacing fluids and blood during the operation. About one in ten patients will need blood transfusions during or after the operation. You will have a chance to meet the anaesthetist and ask any questions on the day of the operation.
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When is surgical removal of the tumours not possible?

Any tests you have will hopefully indicate that your tumours have not spread. Nevertheless, problems are sometimes discovered during the operation that could not be identified before surgery. If you have cancer, this could be that the cancer has spread to other organs, or is fixed to important structures. Such findings are uncommon in patients with neuroendocrine tumours, but more likely in patients with pancreatic adenocarcinoma. In these cases, the cancer may not be removed. Your surgeon may then choose to perform a bypass operation, so that future blockage of the bile duct or stomach is prevented.

How do I prepare for surgery?

If you smoke, try to stop as soon as you know that you need an operation. You will also need to plan for any additional help you may need at home while convalescing, particularly if you live alone. You will be invited to attend a pre-assessment clinic before the operation. Take a list of your medication with you to the hospital. The team at the clinic will give you further instructions and explain what you can expect during your admission.

If your skin and eyes go yellow, this shows that you have jaundice which is caused by a blockage to the bile duct. If this is the case you will likely undergo an endoscopy (ERCP) to place a plastic tube (or stent) into the bile duct. This unblocks the bile duct and allows bile to flow normally.

What happens after the operation?

You will return to the ward after spending some time in the recovery area of the operating suite. The nursing staff will monitor your progress and administer painkillers. You will be on intravenous drips and will not be allowed to eat for the first 5-6 days. It is important that you get out of bed and move about as soon as possible. A physiotherapist will assist you with breathing exercises, which are important in order to prevent a chest infection.

How long will I be in hospital after the operation?

Most patients are able to go home 7-14 days after the operation. You will be given painkiller medication to take at home as needed, and a follow-up visit at the surgical outpatient clinic will be arranged for you.

When can I return to normal activities?

On your return home, you will find movements and activity difficult for the first few weeks, and you are likely to need help. Your ability to eat will also take several months to improve. You may also feel low in mood, but this will resolve shortly. It is important to keep as active as possible, but also to rest. You may return to normal activities after 2-3 months. There are usually no restrictions on activities after that time.
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Will I require any further treatment?
If you retain a portion of your pancreas after the operation, it is possible that more tumours may grow, though these may not be functioning (secreting hormones). As such, you should always be aware of any symptoms you experienced before the operation returning, as this may mean that you need further treatment (although this shouldn’t be necessary for a number of years).

In some cases of cancerous tumours, the survival rate can be improved by adding chemotherapy to surgery. If appropriate, the option of having chemotherapy will be discussed with you. You may be referred to see an oncologist, a specialist in the medical treatment of cancers with chemotherapy.

Will I become diabetic after a Whipple operation?
The pancreas produces the hormone insulin which is required for control of blood sugar, so there is a risk of developing diabetes after this operation. There is evidence from some experienced centres that patients who are not diabetic before surgery are unlikely to develop diabetes afterwards, while patients who are diabetic before surgery are likely to need additional diabetic medication or insulin after surgery. If a patient has previously had a distal pancreatectomy, this may mean that the removal of the head of the pancreas will be the removal of all the pancreas that remains. In this instance, diabetes after the operation is certain.

What are the long-term consequences of the operation?
Some of the long-term consequences of the Whipple operation are:

- **Malabsorption:** this is the poor digestion and absorption of food, resulting in loose stools that are greasy, pale, and tend to float. The pancreas produces enzymes required for the digestion of food. Removal of part of the pancreas will decrease production of these enzymes. This will need long-term treatment with pancreatic enzyme capsules that should be taken with meals.

- **Alteration in diet:** there is no restriction to your diet after the operation unless you develop diabetes, though you may only be able to eat small amounts at one time. You may need to have small meals and snack between meals to minimise symptoms of bloating or discomfort. A dietician can give you advice about your diet and supplements that you can have between meals to improve your nutrition. It will take several months for your digestion and ability to eat to return to normal.

- **Loss of weight:** it is common for patients to lose weight compared to their weight before their illness. You can expect to start regaining some of the lost weight by three months after surgery.

When should I call my doctor after surgery?
Call your doctor if:

- you develop a fever.
- you develop an unusual degree of pain.
- you develop nausea, vomiting, or diarrhoea, or cannot eat properly.
- you become jaundiced (yellow eyes, dark urine).
- your scar becomes red and painful, or has a smelly discharge.
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For further information:

www.amend.org.uk, tel: 01892 516076
www.cancerhelp.org.uk tel:0808 800 4040
www.diabetes.org.uk, tel: 020 7424 1000
www.macmillan.org.uk, tel: 0845 6016161
www.netpatientfoundation.org tel: 0800 434 6476

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For further information:

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www.cancerhelp.org.uk, tel: 0808 800 4040  
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