Dr Kellee Slater
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Hepato-Biliary & General Surgeon

Gallbladder
Liver
Pancreas

Brisbane Liver and Gallbladder Surgery
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LIVER RESECTION
OR
REMOVAL OF A PIECE OF LIVER

THIS INFORMATION REFLECTS THE PERSONAL PRACTICE OF DR KELLEE SLATER ONLY AND DOES NOT SUBSTITUTE FOR DISCUSSION WITH YOUR SURGEON.

YOUR ADMISSION DETAILS:

Your admission date is: _____

Date of your operation: _____

Fasting time from: _____

Greenslopes Private Hospital Admissions (Phone 1800 777 101) will contact you **the day before** you are due to enter the hospital to confirm the details.

OPERATING ON THE LIVER

Removal of a section of liver is performed for a number of conditions, both cancerous and non-cancerous. These conditions are:

- Primary liver cancer: Hepatocellular cancer (HCC), cholangiocarcinoma (bile duct cancer within the liver)
- Secondary liver cancer: bowel, breast, melanoma, skin, kidney, neuroendocrine
- Non-cancerous liver tumours: adenomas, symptomatic focal nodular hyperplasia (FNH) or haemangiomas that cause pain or fullness
- Cystic disease of the liver: mucinous cysts, parasites (Hydatid), simple cysts that cause pain
- Liver abscesses that do not respond to other treatments
- Diseases where stones form within the liver
- Abnormalities of the blood vessels supplying the liver
- Donation of a normal section of liver for transplant into a relative

Liver resection is a major operation and should only be performed by a surgeon who is experienced in liver and bile duct surgery.

The liver is divided into eight separate segments and different combinations of these segments can be removed in one or more operations depending on the particular condition.

In a patient with a normal liver, it may be possible to remove up to 70-75% of the liver with excellent results. Far less liver can be removed if the patient has cirrhosis or scarring of the liver. The liver does not grow back like a lizard's tail rather the remaining segments of liver grow larger in size to compensate for the missing piece. This growing process is usually completed within 6 weeks of surgery.

If there are multiple tumours in both sides of the liver, you may require two or more operations to remove them all. This is to allow the liver to grow in between operations and enable us to leave enough liver for you to survive.

It is very likely that that your gallbladder will be removed at the time of liver resection whether it has gallstones or not. This is because the gallbladder is attached to the part of the liver to be removed. Another reason for removing the gallbladder is to avoid a difficult re-operation, should you develop gallstones in the future. You will live a perfectly normal life without your gallbladder and will not require any alteration to your diet.

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WHAT TESTS WILL I HAVE DONE BEFORE A LIVER RESECTION IS CONSIDERED?

Planning a liver resection is highly technical and can take some time. There are many tests, both invasive and non-invasive that must be performed before any decisions about surgery can be made. After each test, the situation is reassessed. The decision not to offer an operation can occur after any or all of these tests. The final decision about feasibility of surgery is made at the actual time of the operation. You can be sure that your case will be discussed in a multi-disciplinary conference with all the surgeons, oncologists and radiologists of our unit and the best course of action devised. You will be included in the decision making.

You must be medically and physically fit to undergo this type of operation. We are generally reluctant to perform a liver resection in people over 80 years of age because even if you are healthy you may not have enough reserve to survive this operation. Of course, there are exceptions to this and we have performed successful liver resections for patients in their late 80s.

Some of the tests you can expect to have may include but are not limited to:

1. CT scan of the chest and abdomen

   This is done to look for cancer outside the liver area i.e. distant spread of cancer to the lungs or abdominal cavity. It also gives information about the anatomy of the liver and their relationship of the blood vessels to the tumour. The computer performing the scan can also help us assess whether you will have enough liver remaining to survive after the operation. It must be done with an injection of dye into the arm to be useful.

2. Heart and lung tests

   These tests help us assess your fitness for major surgery. What we order will depend on your age and other health problems. The tests may be an ultrasound of the heart (echocardiogram), lung function tests and exercise tests.

3. Colonoscopy

   If you have a suspicious mass in the liver and have not had a recent colonoscopy (telescope passed around the lower bowel), we will arrange for you to have one to ensure you do not have a bowel cancer – the most common reason to have a cancerous mass in the liver.

4. MRI

   MRI with an IV contrast agent called Primovist is very useful to tell the difference between different types of non-cancerous tumours. It will not always be needed for cancer. It is very useful if you have cirrhosis of the liver to tell the difference between non-cancerous nodules and cancer.

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A MRI involves lying on a bed in a narrow, noisy tunnel. Some patients find this very claustrophobic. The X-ray Department take great care to make this experience as pleasant as possible.

5. Key hole surgery or diagnostic laparoscopy

This is done under general anaesthesia in the operating theatre. A small cut is made in the belly button and the tummy cavity is blown up with gas. A camera is inserted. There may be 1 or more additional cuts made to move things around. This test is done if we are worried your cancer may be more advanced that it appears on the scans. It looks for small lumps of cancer that may have spread around the abdominal cavity. This type of advanced cancer is not seen well on scans. This is not done very often for liver tumours.

6. PET Scan

This test relies on the idea that some tumours use glucose faster than the surrounding tissues. Radioactive glucose is injected into the blood and you will lie under a special camera. The glucose may concentrate in areas of cancer spread. It does not work for all cancers but is useful for bowel cancer and melanoma. It can detect cancer throughout the entire body.

7. ICG –Indocyanine Green Test

This test will be done if you have cirrhosis of the liver. It helps us decide whether your liver will have enough reserve to cope after a piece has been removed. Indocyanine is a green dye that will be injected into the blood via a small needle in the arm. A normal liver will rapidly break down this dye and it will be passed in the urine. A liver with cirrhosis is less efficient at breaking down the dye. A special device, similar to a soft peg will be placed over your finger. After 15 minutes the machine shines a light through the fingernail and can read how much of the dye is left in the bloodstream. If there is more than 15% of the dye still in the blood stream after 15 minutes, there is a high chance that you may develop liver failure if you undergo liver resection.

8. Portal Vein Embolisation

This procedure is done when the tumours are in such a position that there may not be enough liver left at the end of the operation. It is also useful if you have cancer in both sides of the liver. It is done in x-ray and involves a needle being passed through the skin and into the portal vein, the large blood vessel from the liver. On the side of the liver that will eventually be removed, the portal vein is blocked off with small metal coils. When this is done an incredible thing happens – the other side of the liver will begin to grow. After six weeks, the size of the liver is reassessed and if the growth has been significant, then a date for surgery is planned.

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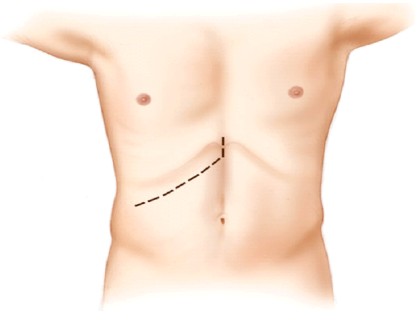
FATTY LIVER DISEASE

- Fat accumulating in the liver is a very common problem in Australia. It occurs in about 1 in 10 people. This fat collects in and around the liver cells and can cause progressive damage. It can lead to cirrhosis of the liver. Fatty liver disease is more common if you are overweight, diabetic, have high cholesterol or drink alcohol. There also seems to be genetic factors involved.
- When the liver is very fatty, it makes liver resection more difficult and increases the risks of bleeding and liver failure.
- The causes of this disease are not completely understood but there are some steps that can be taken to lower the fat content of the liver.
- If your Body Mass Index is >35, you may be asked to undergo pre-operative weight loss. There are supervised rapid weight loss programs like INTENSIV (http://www.intensivweightloss.com/) available to reduce the fat in the liver prior to surgery. Weight loss of even 10 kg makes a big difference in lowering the risks of liver surgery.

THE OPERATION TO REMOVE A PIECE OF LIVER

The operation for removing a section of liver varies a great deal depending on the segments that are to be removed. The most common operations are to remove the whole right side or whole left side. The type of operation will be discussed with you. The surgery is carried out by tying and stapling hundreds of bile ducts and blood vessels in the liver and dividing the liver with a clean cut. Hundreds of tiny titanium clips will be used to secure the blood vessels and they will remain in your body. They are completely harmless and do not prevent you from having an MRI and they do not set the metal detector off at the airport. It is very likely your gallbladder will be removed during the operation as it attached to the liver. Life carries on normally without your gallbladder.

The incision will be in the upper part of your abdomen and either look like a hockey stick or occasionally like a Mercedes Benz sign.



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WHAT TO EXPECT IMMEDIATELY AFTER SURGERY

Pain Relief

On the first day after surgery, there may be a moderate amount of discomfort at the site of the operation.

You will have some form of pain relief. There are two different options:

- Epidural (if medically suitable) – this is a fine tube placed in the back that delivers local anaesthetic to the nerves around the spinal cord. It is highly effective and you will still be able to walk with it in. This option may only be used in minor liver resections because the blood may become thin and increase the risk of bleeding around the epidural.
- Patient Controlled Analgesia (PCA) and a "Pain buster" - a button you will press that results in strong pain killers (like morphine) running straight into your IV line. This is combined with a tiny catheter placed in the wound that delivers local anaesthetic. These devices are very safe and have locking mechanisms to prevent overdose.

IT IS VERY IMPORTANT THAT YOUR RELATIVES DO NOT PUSH THE PAIN BUTTON FOR YOU AS THIS WILL RESULT IN AN OVERDOSE OF MEDICATION THAT MAY STOP YOU BREATHING.

Your anaesthetist will discuss the pros and cons of each, prior to surgery. Either option may not be suitable for every person.

Every effort will be made to minimise your discomfort and make it bearable. Your nurses will be monitoring your level of pain frequently.

When you start eating, you will be converted to oral pain relief.

Drain tubes

You will have a number of plastic tubes coming out of your body following surgery. They will vary a little depending on your particular medical need. They will be removed at variable times following your surgery under our direct supervision.

1. **IV line:** In your arm and in your neck (placed under anaesthesia) to give you fluids and pain relief.
2. **Urinary catheter:** tube placed in your bladder so you don't have to get up to pass urine.
3. **Arterial line:** a fine catheter inserted into the artery of the wrist to monitor the blood pressure.
4. **Abdominal drain tubes:** two or three soft plastic drains coming out of your abdomen that are placed along the cut surface of your liver to drain blood or bile so it does not collect in your abdomen.
5. **Stomach tube**: occasionally you will wake up with a tube in your nose that goes into your stomach to stop vomiting. This will usually be removed a day or two after surgery.

Intensive Care

After the operation is finished, you will be transferred to intensive care. You may be kept asleep (induced coma) for a short time after the operation. Alternately you may be woken up straight away. There are many factors that go into making this decision and your family will be told whether you will be awake or left asleep. You will spend at least one night in intensive care.

Eating

You will not have anything to eat or drink for the 1 – 2 days after surgery. An intravenous infusion will provide you with the necessary fluids.

We will let you know when you will be able to eat.

It is very common that you will lose your ability to taste food. This will return in the first month after surgery.

It is normal to have a sore throat for a few days after the surgery.

People who drink more than two cups of coffee a day may notice a caffeine withdrawal headache and irritability a few days after surgery.

Urinating/Bowel Movements

For the first few days there will be a catheter in your bladder so you will not have to get up to pass urine. You will probably not have a bowel movement for several days after the surgery. Your bowels will work even though you haven't eaten much. We will start laxatives shortly after the operation and it is always good to eat natural stool softeners like prunes and fibre.

Activity

You can expect your nurse and physiotherapist to help you to get out of your bed on the first day after surgery. You will be able to walk short distances even with all of the tubes and intravenous lines.

As each day passes your tolerance for walking and sitting in a chair out of bed will increase. This is extremely important to prevent pneumonia, clots in the legs and loss of general condition.

Your Incision

You can expect to have a waterproof dressing over your incision for the first 5 days. We will remove the dressing at the appropriate time. You will be able to shower with the waterproof dressing on. It is quite common to have a small amount of leakage from the wound. There will usually be no stitches to remove.

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Other Medications and Preventative Measures

You will be given a blood thinner once or twice a day as a small injection under the skin. This helps to prevent clots in the legs or deep venous thrombosis (DVT) that may travel to the lungs and be life threatening. If you are in a high risk group for DVT, you may be sent home with this injection for several weeks after surgery. You or a family member will be taught how to give the injections.

You will be asked to wear TED stockings throughout your hospital stay. These help prevent clots in the legs. You may discontinue these when you are able to get up and walk easily by yourself.

In many instances you will be given a medication to decrease the acid secretions in the stomach. This prevents stomach ulcers that may occur after major surgery.

A physiotherapist will see you daily whilst in the hospital. You will be shown breathing exercises and be given a breathing device (Triflow) to help to expand your lungs and prevent pneumonia.

You must not smoke at all.

After surgery, alcohol should be avoided for at least two months to give your liver the best possible chance to be healthy.

Other Important Information

You can expect to see your primary surgeon every week day. On weekends or at times when your surgeon is operating elsewhere, you will see one of the practice partners. All are very experienced in this type of surgery and commonly assist each other in the operating theatre.

We will make every effort to keep you informed of your progress. We will always be honest and open with you and your family. Feel free to ask questions.

Length of Stay in Hospital

On average most patients will expect a 1 – 2 week hospital stay after a straightforward liver resection. This time can differ greatly for individual patients and individual operations. Some people go home faster than other and others stay much, much longer. You will not be discharged before you can walk unaided and care for yourself.

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WHAT ARE THE COMPLICATIONS THAT MAY HAPPEN IMMEDIATELY AFTER SURGERY FOR LIVER RESECTION?

Liver surgery is a complex procedure with many potential complications. In the hands of surgeons who are experienced, the complication rate is usually very low.

The most serious and specific complications that may be seen after this operation include:

Bleeding

This usually occurs during the course of your surgery and occasionally in the 48 hours after. You may require a blood transfusion. It is uncommon to have to return to theatre post-operatively for bleeding but this certainly may occur. Approximately 15 – 20% of patients having a liver resection will need a blood transfusion. The chances of acquiring a viral disease such as Hepatitis B, C or HIV via blood transfusion are exceptionally low.

Bile leak

When the liver is divided in two, hundreds of tiny bile ducts and blood vessels must be tied and clipped. Occasionally one of these bile ducts will open up in the post-operative period and a leakage of bile will occur. This is usually obvious in the soft drain that is left in your abdomen after the operation.

In many cases this bile leak will heal itself. If the bile leak is large in volume or becomes infected, you may require further surgery or a procedure called an ERCP. During this procedure a telescope is placed via your mouth into the bowel and a piece of plastic stent is put in the bile duct to dry up the leak. The stent will need to be removed again after the bile leak is healed.

Insufficient Liver

In cases of patients with cirrhosis or patients having a large amount of liver removed, the remnant piece of liver is not enough to allow the body to function. This may be a fatal condition and is fortunately very rare. This is why all liver surgery must be carried out by an experienced surgeon. Patients with a small liver remnant after liver surgery may become jaundiced and may remain so for many months. A small remnant may result in weeks and months spent in the hospital.

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Other immediate complications of liver surgery

Like all major surgery there are a number of serious complications that may occur. These must be dealt with on a case-by-case basis. Some of these complications are:

- Death: approximately 0.5 – 1% of all patients having this type of operation.
- Infections: wound, pneumonia, urine, intra-abdominal, epidural related, IV line related.
- Epidural related complications: bleeding around the spinal cord that may result in permanent paralysis (this is extremely rare).
- A twisting of the liver, that cuts off its blood supply. If this is not recognized early it can be fatal.
- A hole in the diaphragm (muscle between lungs and abdomen) that may require a tube in your chest. This is sometimes done intentionally to fully remove a tumour.
- Damage to one of the major bile ducts in the remaining liver – requiring further surgery.
- Damage to the hand from the arterial line in the wrist.
- Punctured lung secondary to the IV line in your neck.
- Clots in the legs that may travel to the lungs.
- Stomach ulcer that may bleed: this may present as a vomit of blood or black bowel motions.
- Urinary catheter complications: unable to pass urine after catheter removed especially in men
- Weight loss: it is common to loose about 5 – 10% of starting body weight after this surgery (approximately 5 – 10 kgs).
- Wound pain and prolonged numbness under the wound.
- Hernia of the wound.
- Permanent or temporary damage to nerves in the arms, legs and neck due to prolonged immobilisation on the operating table. This may result in loss of feeling or movement.
- Bowel obstruction due to hernia or adhesions. This risk is life long.

AFTER DISCHARGE

What are the long-term complications after Liver Resection?

Once the recovery process is complete, there are very few long-term complications. Most complaints relate to some pain around the wound, numbness and occasionally hernias.

After any abdominal surgery there is a life long risk of bowel obstruction due to scar tissue forming in the abdomen.

Loss of weight

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It is common for patients to lose up to 5 to 10% of their body weight compared to their weight prior to their illness. Most people can expect to regain the weight within 3-6 months after the surgery.

How you may feel

You may feel weak or "washed out" when you go home. You might want to nap often. Even simple tasks may exhaust you.

You might have trouble concentrating or difficulty sleeping. You might feel depressed or worried about the future.

These feelings are normal and usually transient and can be expected to resolve in about 4 – 8 weeks.

Going home

You will not be sent home until you are walking unaided and able to care for yourself. You may need to have help at home preparing meals and cleaning because you will be tired for several weeks. This is a time to rely heavily on family and friends and it is a good idea to have someone at home with you for the first week or two.

Your medications

We will discuss with you which medications you should take at home. If needed, you will go home with a prescription for pain medicine to take by mouth. It is also common to leave with a medication to prevent stomach ulcers.

Your incision

Your dressing will be removed before you leave the hospital and if it is not leaking it will be left open to the air. You may wear loose clothing over the top of it. It is normal to leave the dressing in place for 5 days before it is removed.

Your incision may be slightly red along the cut. This is normal. If there is spreading redness or a new painful or uneven bulge appears, this is not normal and you should contact the rooms as soon as possible.

You may see a small amount of clear or light red fluid staining your dressing or clothes. If it is minor cover that part of the incision with a pad. If leaking is severe or if it is pus, you should contact the rooms.

You may gently wash dried material off from around your incision. Pat your wound dry with a towel. Do not rub soap, talc or moisturiser into your incision until at least 4 weeks or until it is fully healed. You may rub vitamin E cream onto the incision after it is fully healed.

It is normal to feel a ridge along the incision. This will go away.

It is normal to not be able to lie on your right side for several weeks after the operation.

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It is normal to have a patch of numbness under the wound. This will not go away, but you will stop noticing it over time.

Over the next few months your incision will fade and become less prominent.

Your deep muscle layers are sewn together with nylon stitches that do not dissolve. If you are thin, you may feel the knotted end of one of these stitches under your wound. This is harmless. If it annoys you, it can be easily removed at some time after your surgery. It is very common to have a prickly end of a stitch poking out of the end of the wound. This happens as the stitches dissolve. If it bothers you, you may snip it off with a pair of scissors. Otherwise it will disappear about 8 weeks after the surgery.

Activity

Do not drive until you have stopped taking narcotic pain medication and feel you could respond in an emergency.

You may go outside, but avoid traveling long distances until you ask us about it at your next visit. If you need to fly home, you will be given a clearance letter to fly.

Do not lift more that 10kg for 6 weeks. (This is about the weight of a briefcase or a bag of groceries). This applies to lifting children, but they may sit on your lap.

You may start some light exercise when you feel comfortable. You may climb stairs.

You may gently swim after 2 weeks.

Heavy exercise may be started after 6 weeks - but use common sense and go slowly at first.

You may resume sexual activity when you feel ready.

WHAT CAN I DO WHILE I AM AT HOME WAITING FOR MY OPERATION?

You may be at home for the few weeks before your operation date.

We recommend the following to get yourself in the best condition possible:

- It is best to try and eat healthy, fresh food. A high protein diet is especially good. This means lots of meat, fish, eggs along with fruit and vegetables. If you feel unwell, you may not feel like eating much, so it is important to pay attention to this as though you were training for a marathon.
- Take a simple multivitamin daily (purchased from the chemist or supermarket).
- Try and do some light activity each day like a short walk in the cool of the day.
- Do not smoke.
- Avoid all alcohol as soon as the diagnosis is made.
- Do not take any herbal preparations or products claiming to be liver cleansers. These occasionally result in liver failure and there is no proof that they are of benefit.

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WHAT SHOULD I BE AWARE OF IN THE DAYS BEFORE MY OPERATION?

Hospital

The hospital will call you the day before your operation to confirm your admission time.

Fasting

You must have nothing to eat or drink for six hours prior to surgery. (You may take sips of water up until 2 hours before the operation and you may take your medications with a sip of water). You must not chew gum or smoke on the day of the operation.

Medications

- If you are on blood thinners such as Aspirin, Warfarin, Plavix, Iscover, Clopidogrel, Pradaxa, Dabigatran, Rivaroxaban, Xarelto or anti-inflammatory drugs (Brufen, Mobic, Voltaren, etc), they can cause bleeding during surgery. We will advise you about what to do with these drugs prior to surgery. You must let us know about these drugs and the decision to stop them is based on each individual patient's needs.
- Diabetic medications: we will give you advice on whether to take your diabetic medications on the morning of surgery or not. Some diabetics will be admitted the night before the operation.
- If you are on Prednisone, you should not stop this drug suddenly.
- Cholesterol lowering medication should not be taken when you are fasting.
- If you are taking any alternative medications e.g. St John's Wort, fish oil or garlic, you should stop these tablets one week before surgery as they may result in excess bleeding.
- You may continue to take a multivitamin.
- Continue to take all other medications, even on the morning of surgery with a small sip of water.

Income Protection Insurance and Centrelink

If you have income protection insurance, start doing the paperwork required to claim before the operation. Centrelink claims take many weeks to process. It is difficult to recover well when you are worried about finances. Before any major surgery it is wise to get your affairs in order including an Advance Health Directive, Will and Power of Attorney.

Queensland Cancer Council

Call the Queensland Cancer Council 13 11 20 as they have a number of general support financial assistance programs in place if needed.

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Family

This is the time to rely on family and friends for support. If you receive offers of home cooked meals and household help, accept them happily. That way you can concentrate on getting better.

Other things to know

- You must bring all relevant x-rays to the hospital with you.
- If you smoke, it is in your best interests to stop completely as soon as you can. See your GP for alternatives or call Quitline (13 18 48) if you wish to seek advice.
- You should also abstain from drinking alcohol 24 hours prior to any surgery.
- Bring all your current medications with you to the hospital.
- For the first few days you will wear a hospital gown, but also bring comfortable pyjamas, personal toiletries, small change for newspapers etc.
- Do not bring large amounts of cash or valuables.

WHAT WILL THIS SURGERY COST ME?

I largely work as a 'no-gap' doctor. This means that the surgeon fee for your operation will be sent to your health fund and there will be no 'gap' or extra amount of money to pay. There are always exceptions and decisions regarding this are made on a case-by-case basis.

If you do not have private health insurance or if you have overseas insurance, you will be given a quotation for surgery, anaesthetic and hospital fees and must pay in full ***prior*** to the operation.

This surgery is technically demanding. I will have another consultant surgeon assisting at your operation. The remuneration for the assistant is very low for the work required and as a consequence there may be an out-of-pocket charge for the assistant.

If your Body Mass Index is >35 i.e. you are morbidly obese, the surgery is far more difficult and the risk of complications including liver failure is higher. If it is medically suitable, we may recommend a period of weight loss in a medically supervised program called INTENSIV before the liver resection, so it can be performed more safely. This will incur an extra out of pocket expense.

Outpatient consultations are not covered by the health funds and there will be a charge for these meetings. You will get a proportion of this money back from Medicare. There is no fee to be paid for normal care after the operation.

There may be other out-of-pocket fees from your anaesthetist and any other specialists who are asked to look after you. You should ask them ahead of time any out-of-pocket costs. Ask us who will be performing your anaesthetic and you can make enquiries with them.

There may be extra costs for x-ray, pharmacy and pathology. Intensive Care is usually billed straight to your health fund with no more to pay.

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You have a right to gain 'Informed Financial Consent'. Fees from other practitioners are beyond our control and you should ask for the costs from each person who is asked to look after you. Patients have a choice when it comes to paying for their health care and you are fully within your rights to negotiate and shop around.

If you do not live in Brisbane, you will be responsible for all out of hospital accommodation, hotel, meal and transport costs for you and your family. There is some monetary assistance available for private patients through the Patient Travel Subsidy Scheme (PTSS) providing assistance to patients and in some cases their carers, to enable them to access specialist medical services that are not available locally. Please see Queensland Health's Patient Travel Subsidy Scheme site for details. http://www.health.qld.gov.au/iptu/html/ptss.asp. Greenslopes Hospital web site has an extensive list of hotels available in the local area. http://www.greenslopesprivate.com.au/For-Visitors/off-site-accommodation.aspx.

ABOUT YOUR SURGEON

Dr Kellee Slater MBBS (Hons) FRACS

2006 – Present	Staff Surgeon Hepatopancreatic-Biliary-Liver Transplant Princess Alexandra Hospital and Greenslopes Private Hospital Brisbane, Queensland
2004 – 2006	Hepatobiliary and Liver Transplant Fellowship Princess Alexandra Hospital Brisbane, Queensland
2002 – 2004	Liver and Kidney Transplant Fellowship University of Colorado Hospital Denver, Colorado, United States of America
2002	Fellow of the Royal Australian College of Surgeons (FRACS) General Surgery
1989 – 1994	MBBS (Honours) University of Queensland

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