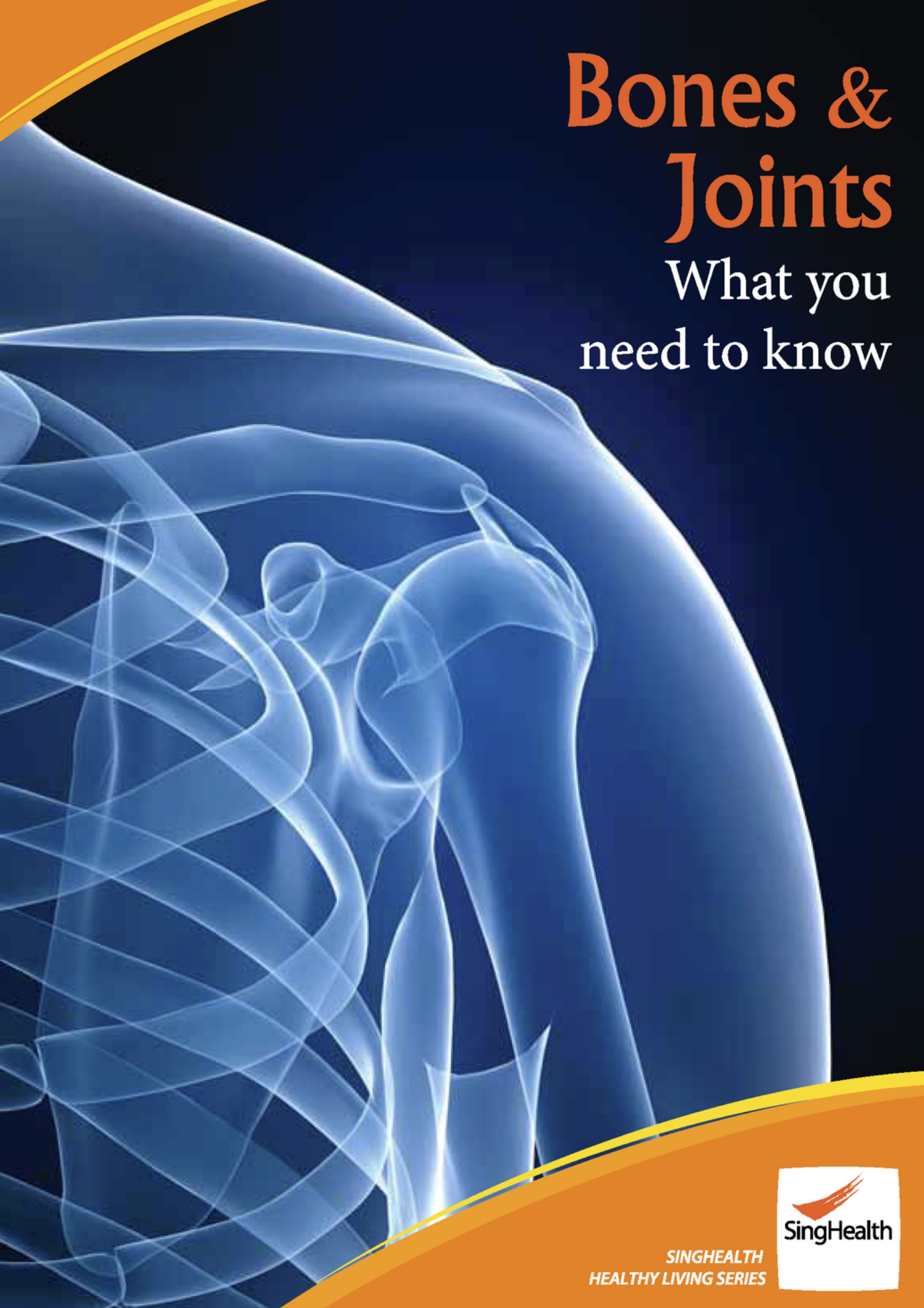


Bones & Joints

What you
need to know






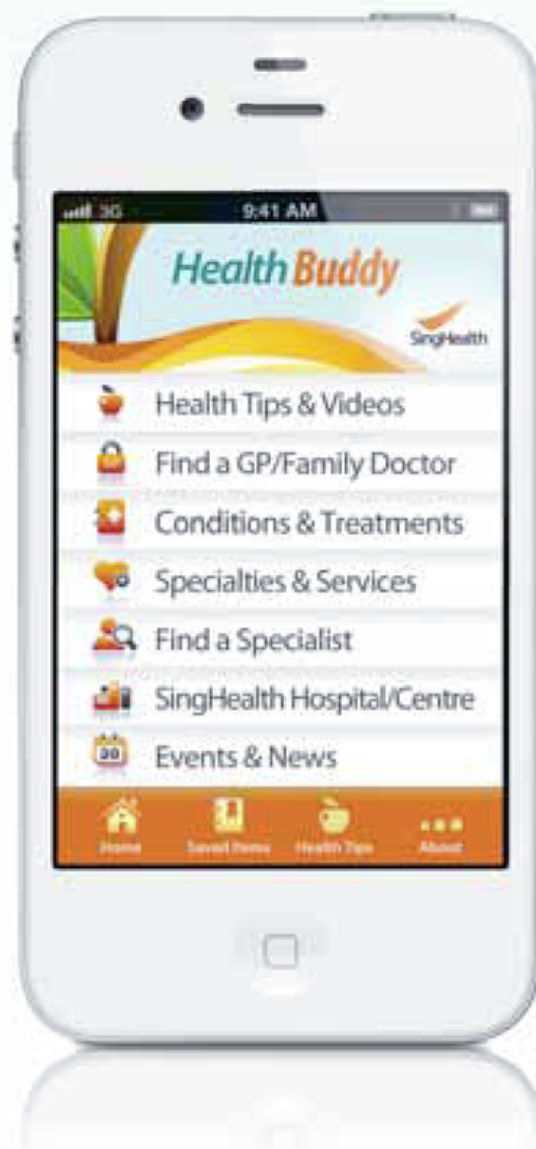
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Contents

All About Your Bones & Joints	5
Common Diseases	
Arthritis	7
Osteoarthritis	8
Gout	13
Rheumatoid Arthritis	17
Spondyloarthritis	19
Osteoporosis	23
Common Injuries & Disorders	
Spine	27
Knee	31
Shoulder and Elbow	38
Hip	45
Foot and Ankle	48
Orthopaedic Problems in Children	50
Information About:	
Singapore General Hospital	59
KK Women's and Children's Hospital	64
Changi General Hospital	66
Seng Kang General Hospital	68
National Neuroscience Institute	70
SingHealth DUKE-NUS Spine Centre	71
Patient Liaison Service Department	72
Acknowledgements	74

All About Your Bones and Joints

Bones and joints problems are extremely common and are a major cause of reduced activity and disability. These problems can range from congenital deformities, fractures, diseases such as various types of arthritides, to degenerative conditions.

Although problems of the bones and joints become more common as we get older, all age groups, even the very young, are not immune to it.



Children

In the very young, injuries are the most common bones and joints condition.

However, changes in children's bones due to growth makes diagnosing paediatric fractures in children's bones challenging. Therefore, there is often a need for repeated reviews to ensure that this is not missed. Bone conditions associated with congenital conditions, such as metabolic conditions of the bone, and infections can also affect young children.

Adolescents

In the adolescent age group into the early adult years, injuries of the bones and joints remain the most common. Injuries include not only fractures of the bones, dislocations of joints, and soft tissue injuries due to acute injuries, but also stress injuries of the bone and soft tissue due to repetitive actions as the result of sport or work activities.

Middle Age to Elderly

For the middle-aged adult to the elderly, degenerative bones and joints conditions become progressively common. Degenerative conditions

involve the bone and soft tissues mainly around the joints as the result of wear and tear over the years. Bone and joint problems resulting from complications of other diseases also becomes increasingly common. Common examples include diabetic foot infections, and gout. Injuries, however, remain common in older adult patients, especially the elderly. In the elderly, injuries can often arise because of poor eyesight, and deteriorating muscle strength and co-ordination.

Bone Tumours

While bone tumours are uncommon, these often affect the young and older patients. In the young, the problem normally involves primary bone tumours. In older patients, metastatic disease from primary tumours in other parts of the body is most common. Of course, tumours can occur in any age group, male or female. However, certain tumours are more common in some

age groups, and others have certain predisposition to gender.

In conclusion, a wide range of bone and joint conditions can affect the human body, with some conditions more common in certain age groups. Early intervention can not only prevent further worsening of the problem, it can also help reduce the pain and discomfort for you. So seek medical advice from your doctor if you have any doubts or indications of any problems.



Arthritis

Arthritis is often thought of as a disease that affects the elderly. That is perhaps the most commonly held misconception. Here we set the record straight.

What is Arthritis?

Arthritis refers to the inflammation of the joints. A person with arthritis will typically complain of pain and swelling in the joint(s). Both small joints, such as those in the fingers, and large joints, such as the knee and hip, can be affected.

With worsening arthritis, the joints can become stiff or deformed, resulting in decreased mobility and increased disability.

Besides arthritis, there are many causes of pain at or near joints. These musculoskeletal problems are extremely common. Pain at or near the joints can also be due to soft tissue and bony problems such as tendinitis, bursitis, myalgia and fractures.

Types of Arthritis

Arthritis can be broadly classified into 2 main groups:

- i) Osteoarthritis (OA) or degenerative joint disease



- ii) Inflammatory arthropathies
 - Rheumatoid arthritis, gout or spondyloarthropathies

Osteoarthritis is the most common form of arthritis. A form of degenerative or 'ageing' disease, it is more common among the elderly although young people may also suffer from it, especially if they have had a significant injury to the joint.

Symptoms

One or more of the classic signs of inflammation should be present – redness, pain, tenderness, swelling and limitation of movement.

Is Arthritis the same as Rheumatism?

Rheumatism is a very general term which people use to describe pain and/or stiffness of muscles and joints. Patients who complain of 'rheumatism' may be suffering from arthritis.

Specialist services available at the following institutions:
 • Singapore General Hospital Tel: 6321 4377

Osteoarthritis

The most common form of arthritis, Osteoarthritis (OA) affects an estimated 40% of the adult population. Of these, only 10% seek medical advice and only 1% are severely disabled.

Causes

Osteoarthritis (OA) means inflammation of the joints although it is better known as a degenerative disease due to the inflammation of the joints with thinning of the articular cartilage. The cartilage in our joints allows for the smooth movement of joints. When it becomes damaged due to injury, infection or gradual effects of ageing, joints movement is hindered. As a result, the tissues within the joint become irritated causing pain and swelling within the joint.

Symptoms

In OA, you will have no problem in the morning on arising but as the day progresses your discomfort will increase.

In the evening, there will be a dull ache in the area of the affected joint.

Other symptoms include :

- Pain
- Swelling of the affected joints
- Changes in surrounding joints
- Warmth – The arthritic joint may feel warm to the touch

- Crepitation – A sensation of grating or grinding in the affected joint caused by the rubbing of damaged cartilage surfaces
- Cysts – In OA of the hand, small cysts may develop, which may cause the ridging or dents in the nail plate of the affected finger

The changes associated with degenerative arthritis tend to involve similar joints. Whereas in post-traumatic degenerative arthritis where there is a history of acute or chronic trauma, the changes tend to be isolated to the specific joints injured.

Risk Factors

OLD AGE

As a person grows older, it becomes more likely that the cartilage may be worn away. OA is uncommon in people below 40 years of age.

For surgical treatment options for OA of knee, refer to page 38.



GENDER

Women are more likely to suffer from OA, especially after menopause.

PREVIOUS JOINT INJURY

Someone with a previous injury to the cartilage within the joint, e.g. after a fracture involving the joint or after a sporting injury to the joint will have a higher risk of developing OA later in life.

WEIGHT

A greater than normal body weight puts more stress on the weight-bearing joints such as the hip and knee, increasing the likelihood of developing OA in these joints.

BONE DEFORMITIES

People born with deformed joints or abnormal cartilage have an increased risk of OA.

OTHER DISEASES THAT AFFECT THE JOINTS

Bone and joint diseases that increase the risk of OA include other arthritic conditions such as rheumatoid arthritis and gout.

GENETICS

Genetic factors may predispose to the development of OA.

Diagnosis

The specialist will begin by taking a detailed history of your problem and past medical problems, followed by a physical examination. He may then proceed to other tests, such as:

X-RAYS

This is the most commonly performed test to evaluate the status of the affected joint and the alignment of the joint. Normal x-rays are safe, simple and pain-free.

BLOOD TESTS

Depending on the clinical findings, blood may be drawn for special testing, to rule out other causes of joint pain, e.g. due to rheumatoid arthritis, gout or infection.

JOINT ASPIRATION

Occasionally, especially when the joint is very swollen, the doctor may choose to suck some fluid out of the swollen joint for special testing. Removal of joint fluid also sometimes relieves pain.

Treatment

The goals for treatment for osteoarthritis are :

- i. Pain relief
- ii. Maintenance of function
- iii. Prevention of associated deformities
- iv. Patient education

The treatment for OA depends on the severity of the disease and the patient's own lifestyle expectations.

Early cases of OA can generally be treated with:

- Rest and lifestyle modification, such as weight loss and cessation of smoking
- Use of aid (e.g. a walking stick). Use of good shoes is also helpful for relieving symptoms in some cases of OA
- Exercise and physiotherapy to strengthen muscles and improve joint flexibility
- Medication

In OA of the hand, rest can be accomplished by selectively immobilising the joint in a splint. Splinting is initially done for a period of 3 – 4 weeks, during which the splint is worn continuously.

This is usually combined with non-steroidal anti-inflammatory medication (NSAIDs) taken at the same time. If there is improvement in symptoms, use of the splint during the day is progressively diminished over the course of the coming month/s.

Use of NSAIDs

Gastrointestinal intolerance remains one of the major factors limiting the prolonged use of NSAIDs and may require temporary or permanent discontinuation of the anti-inflammatory agent. Concomitant use of H2 blockers, omeprazole, or misoprostol, a prostaglandin analogue that counteracts the mucosal effects of NSAIDs, may mitigate some of the gastrointestinal effects. Nephrotoxicity is a well-known complication of NSAIDs, and patients with pre-existing renal insufficiency should not take NSAIDs for extended periods.

TYPES OF MEDICATION

There is presently no medication that can cure OA or regrow the cartilage in osteoarthritic joints.

The most commonly prescribed medications are painkillers. The type of painkiller prescribed depends on the severity of the pain. For early disease with mild and occasional pain, simple painkillers such as paracetamol (Panadol®) can be effective, although more severe pain may require the use of non-steroidal anti-inflammatory drugs (NSAID's) for relief. Analgesic (pain-killers) creams and adhesive patches can also be used.

Glucosamine, with or without chondroitin, has also become a popular drug treatment in recent years. It can be purchased without a doctor's prescription.

However, it is ineffective in many patients, especially those with severe OA. The duration of its symptomatic relief also tends to be temporary. There is no evidence that glucosamine or chondroitin is able to result in cartilage repair.

INJECTIONS

For the treatment of OA, your doctor may sometimes recommend a steroid injection into or around the joint if you have not responded to conservative treatment indicated above. While pain relief can be impressive, it is usually only temporary, and your doctor will limit the number of steroid injections that you can receive as repetitive injections can weaken tendons further worsening the already damaged cartilage.



SURGERY

Surgery is usually only offered for severe disease that has not responded to conservative treatments mentioned. Both the type of surgery and the decision for surgery are made following careful discussions between you and your doctor.

For many joints in the hands, arthodesis or fusion of the joint is the method

of choice. In joint fusion, the arthritic surface is removed and bones on either side of the joint are fused to eliminate movement from the problem joint.

There may be some loss of movement but the pain ablation and stability may functionally improve the joint that is severely affected by the degenerative joint disease.

Specialist services available at the following institutions:

• Singapore General Hospital Tel: 6321 4377

Gout

Gout is a form of arthritis that causes sudden, severe episodes of pain, tenderness, redness, warmth and swelling of the joints. It is the most common type of inflammatory arthritis in men over age of 40. Women are usually protected from gout until after menopause.



Causes

Gout is the result of deposits of needle-like crystals of uric acid in the joint spaces. Uric acid, a substance that results from the breakdown of purines in the body, usually dissolves in the blood and passes through the kidneys into the urine. In people with gout, the uric acid level in the blood becomes elevated.

This is called hyperuricaemia and can be due either to the increased production of uric acid eg. due to consumption of food rich in purines or decreased excretion of uric acid from the kidney eg. renal impairment.

Symptoms

An attack often occurs very suddenly with the maximum intensity of pain reached within a few hours. The joint involved can be extremely painful and is often swollen, warm and red. This rapid development of joint pain is a feature that differentiates it from most other forms of arthritis.

The most common joint affected is the first joint of the big toe. Other joints that may be affected are the knee, ankle, foot, hand, wrist and elbow joints. The shoulder, hip joints and the spine are rarely affected.

Risk Factors

- Hyperuricaemia - most people with gout have hyperuricaemia although not all people with hyperuricaemia have gout
- Overweight – excessive food intake increases the body's production of uric acid
- Excessive use of alcohol – alcohol interferes with the excretion of uric acid from the body
- Food with high purine content
- Use of certain medications such as diuretics, salicylates, cyclosporine, niacin, levodopa
- Start of a uric-acid lowering treatment
- Crash diet
- Joint trauma
- Surgery or sudden, severe illness
- Genes

Diagnosis

Besides evaluating symptoms, performing a clinical examination and measuring of blood uric acid levels, the most conclusive test is a joint aspiration. This is a simple procedure where a needle is used to remove a sample of fluid from the affected joint. The presence of uric acid crystals (monosodium urate crystals) confirms the diagnosis of gout. However, the absence of such crystals does not rule

out gout. Most people with gout have hyperuricaemia but hyperuricaemia may not be present during an acute attack. Hyperuricaemia alone does not mean that a person has gout.

Treatment

The treatment of gout depends on the stage of disease. For an acute attack, the crucial step is to provide pain relief and shorten the duration of inflammation. The goal in the management of gout is to prevent recurrent or future gouty attacks with the ultimate objective of preventing joint damage.

Treatment is tailored for each person and medications are

used to: 1) relieve the pain and swelling during an acute episode, 2) prevent future episodes, 3) prevent or treat tophi, which are nodules of crystallised uric acid formed under the skin that can become swollen and cause pain during gout attacks.

MEDICATION FOR ACUTE EPISODES

Non-steroidal anti-inflammatory drugs (NSAIDs) for example, Naproxen, Mefenamic acid, Indomethacin, or Diclofenac are commonly used to relieve pain and swelling during an acute gout episode. NSAIDs usually



begin to work within 24 hours. Their side-effects include stomach upset, skin rashes, fluid retention or kidney problems and stomach ulcers. They should be used cautiously in patients with kidney impairment and stomach ulcers. Newer drugs called COX-2 inhibitors may be safer for the stomach.

Corticosteroids work quickly as well and can be taken by mouth or injected directly into an inflamed joint to relieve the pain and swelling of an acute episode of gout.

Colchicine gives prompt relief when taken at the first sign of an attack. Common side effects include abdominal cramps or diarrhea. Lower doses of colchicine can be taken daily to prevent future attacks.

MEDICATIONS THAT CONTROL URIC ACID LEVELS

Long term management of patients with gouty arthritis is to reduce blood uric acid levels so that future episodes of gouty attacks can be prevented. This is achieved by - medications such as Allopurinol or uricosuric agents (i.e. medications that result in increased urate excretion from the kidneys). These medications do not relieve the pain and inflammation of an acute episode and are usually started after the acute episode of gout is treated. They may occasionally cause you to have more gout episodes when first started, hence you may be prescribed colchicine or NSAIDS to be taken at the same time.

Allopurinol decreases the blood uric acid level and has to be taken daily. It can also reduce tophi size and prevent formation of crystal deposits in joints and other tissues. The most common side effect is skin rash and has to be discontinued if you develop any rashes or itch.

Allopurinol is usually taken daily and for years. It should not be stopped during an acute episode of gout.

Uricosuric drugs such as probenecid lower the blood level of uric acid by increasing its excretion in the urine. They are not as effective as allopurinol and

do not work as well in people with renal impairment. Patient should drink plenty of water as the excretion of uric acid in the urine may lead to formation of stones in the kidney.

Ultimately, your doctor will advise you regarding the types of medication(s) you need and monitor their side-effects.

Other problems in gout

Gout may be associated with high blood pressure, diabetes, kidney diseases and obesity. It may be important to screen for these diseases. Uric acid crystals can form deposits in the kidneys or the ureter leading to renal or ureteric stones. This can lead to renal impairment.

Dietary advice if you have gout

Diet plays an important role in the management of gout. Patients with gout should avoid food with high purine content. It is also important to drink lots of water (at least 2 litres per day) unless instructed by a doctor not to do so. Patient should also reduce the consumption of alcoholic beverages and reduce weight. However, crash dieting is not advised.

FOOD HIGH IN PURINE CONTENT (RESTRICT YOUR INTAKE)

Asparagus, Cauliflower, Mushroom, Oatmeal, Wholegrain, Wheat, Germ, Red Meat

FOOD HIGHEST IN PURINE (ABSTAIN COMPLETELY IF POSSIBLE)

All Internal Organs of Animals and Birds, Liver, Kidney, Brain, Pancreas

Rich Games – Venison, Gamebird Pigeon, Black Chicken

Meat Extracts – Gravies, Chicken Essence, Bak Kut Teh

Certain Fish/Shellfish – Salmon, Herring, Mackerel, Anchovies, Sardines, Cockles, Mussels, Scallops, Prawns

Certain Vegetables – Spinach, Peas, Beans, Peanuts, Carrots

Products of Beans – Beancurd, Soya Bean Drink, Bean Sprout, Bean Cake, Moon Cake, Legumes

Fruits – Strawberries, Strawberry Jam, Durian, Tomato, Tomato Sauce

Alcohol – Beer, Champagne, Brandy, Whisky, Port

Specialist services available at the following institution:

• Singapore General Hospital Tel: 6321 4377

Rheumatoid Arthritis

Rheumatoid arthritis (RA) is the most common autoimmune rheumatic disorder and affects around 1% of the population, which is equivalent to about 45,000 people in Singapore. A chronic inflammatory disorder, it affects the joints and less frequently, the skin, eyes, lungs and other organs.



Symptoms

Rheumatoid Arthritis (RA) causes joint stiffness, pain and swelling and possibly other organ damage. The joints affected and severity of joint or other organ inflammation varies between people.

Sometimes, a person may not realise for a long period of time that he has RA because the symptoms may be as subtle as persistent tiredness and mild joint stiffness.

Risk Factors

RA affects all races and 75% of patients are female. The age at which RA most frequently begins is between 20 and 45 years old. Although the exact cause for RA is unknown, it seems that certain people inherit the tendency to develop RA.

That means that your children will be more likely to develop RA if you suffer from RA but the risk is still low.

Diagnosis

In order to diagnose RA accurately, a doctor must evaluate the patient and usually also perform blood tests and x-rays. It is very important to diagnose RA as early as possible as research has shown that prompt treatment improves the chances for the patient to be treated effectively so that the joint and organs remain healthy and not permanently damaged. Referral to a rheumatologist (a specialist doctor who looks after patients with rheumatic disease) is often helpful for confirmation of RA and treatment.

Treatment

Upon confirmation of the diagnosis of RA, the attending doctor will determine the type of medication suitable for the patient based on individual requirements. Examples of medications used to treat RA are NSAIDS (Diclofenac), prednisolone, hydroxychloroquine, methotrexate and TNF - blockers such as etanercept and infliximab. The attending doctor may also arrange for the patient to meet the rheumatology nurse clinician, physiotherapist and occupational therapists, if appropriate.

RA causes mainly joint but possibly other organ inflammation as well. Referral for evaluation should be considered as soon as possible if RA is suspected so that appropriate treatment can be given to prevent permanent organ damage. At the moment, there is no cure for RA but rapid research developments have given rise to treatments that have enabled people affected by RA to live normal lives.

Specialist services available at the following institutions:
• Singapore General Hospital Tel: 6321 4377

Spondyloarthritis

Spondyloarthritis is an inflammatory rheumatic disease affecting the spine, joints and entheses (which are sites of insertion of a ligament, tendon, or articular capsule into bone, for example the Achilles tendonitis, plantar fasciitis). It is a collective group of several related diseases: Ankylosing spondylitis, Psoriatic arthritis, Enteropathic arthritis, Reactive arthritis, and Undifferentiated spondyloarthritis.

Causes

This family of conditions are recognised as chronic autoimmune diseases with unknown cause, but genes may play a role and an infective trigger may sometimes be present.

Symptoms

In spondyloarthritis, there is inflammation of the spine, joints and entheses. If it involves fingers and toes, they may swell and take the appearance of 'sausage digits'.

All of these diseases display a variety of symptoms and signs, but they share many similarities, including:

- presence of enthesitis (inflammation of an entheses) (defined above)
- absence of positive blood test for rheumatoid factor ('seronegative')
- a tendency to occur in more than one family member

Ankylosing Spondylitis (AS)

Ankylosing Spondylitis is a long-term disease that affects the joints in the spine, pelvis and, often, the peripheral joints such as hips, knees, ankles and feet as well. The main problem is chronic inflammation that may eventually cause the spine to fuse together.

The condition usually starts with low back pain that is worse at night, in the morning, or after prolonged inactivity, and tends to improve with exercise. Limited expansion in the chest may occur as a result of inflammation of the

joints between the ribs. As the disease progresses, any portion of the spine may be affected.

The disease affects more males than females although females can also be affected. It tends to begin between age 20 and 40. Risk factors include having an affected family member and male gender.

Diagnosis on Symptoms

It is important that you give a detailed history of your symptoms to your doctor as, often, the diagnosis can be made based on your symptoms. Specific symptoms of ankylosing spondylitis include stooped posture and back pain that is worse at night, in the morning or after inactivity.

Neck, hip and heel pain, pain and swelling in the shoulders, knees and ankles, stiffness in the back, limited chest expansion and range of motion involving the spine and hips, fatigue, mild fever, loss of appetite, loss of weight are also symptoms. Other uncommon complications include eye inflammation, lung fibrosis and disease of heart valves.

Psoriatic Arthritis

Psoriasis is a scaly rash that can affect any part of the body, but most frequently the elbows, knees and scalp. In about 5 – 10% of patients with psoriasis, arthritis may also occur, giving rise to psoriatic arthritis. Apart from involvement of the spine, pelvis and joints, psoriatic arthritis is often accompanied by changes in the finger nails and toe nails such as the appearance of small pits.

Enteropathic Arthritis

Enteropathic arthritis is a form of spondyloarthritis that is associated with inflammatory bowel disease, such as Crohn's disease or ulcerative colitis, which typically causes inflammation of the intestines. About 1 in 6 people with inflammatory bowel disease will develop enteropathic arthritis affecting the spine and joints.

Reactive Arthritis

Reactive arthritis refers to a type of spondyloarthritis that may be triggered by certain germs which cause gastroenteritis or urinary tract infections. Reiter's syndrome is a form of reactive arthritis which may also affect the eyes and the skin.



Undifferentiated Spondyloarthritis

Not all patients have classic signs and symptoms that fit neatly into one of the categories outlined above, especially at the start of the illness. In such cases, the term, undifferentiated spondyloarthritis may be used.

Prevention

Although there is no prevention or cure for spondyloarthritis, the awareness of risk factors and symptoms allows for early detection and treatment. Contact your doctor if you have symptoms suggestive of spondyloarthritis or if

you have already been diagnosed with it and new symptoms or complications develop.

Diagnosis

In addition to taking a history and examination, your doctor may recommend certain blood tests such as a Full Blood Count, ESR, HLA-B27, and x-rays of the spine and pelvis to support the diagnosis.

HLA-B27 is a known genetic marker for ankylosing spondylitis. However, most HLA-B27 individuals do not have the disease, therefore it is not advisable to have the test if you do not have

symptoms of ankylosing spondylitis, even if you have an affected relative.

Treatment

As a first line treatment, your doctor may prescribe non-steroidal anti-inflammatory drugs (NSAIDs) to reduce inflammation and pain. Occasionally corticosteroids may be prescribed for short-term use to suppress unwanted inflammation. Sometimes more potent drugs such as methotrexate or sulfasalazine may be prescribed if you do not respond well to NSAIDs or are dependent on high dose steroids.

Newer drugs called TNF blockers which block inflammatory proteins, have been shown to be highly effective in treating arthritis of the joints as well as spinal arthritis. This group of medication include Enbrel®, Remicade® and Humira®.

Surgery may very occasionally be needed if joint damage is severe and there are significant secondary degenerative changes.

Importance of Exercise

Exercise plays a very important role in helping to improve posture by reducing stiffness and pain. Most patients will benefit from a daily home exercise regime as recommended by a physiotherapist. Excessive inactivity can certainly increase the risk for spinal fusion. However, bear in mind that if you have Ankylosing Spondylitis, you should avoid high impact sports and heavy weight bearing exercises due to the increased risk of spinal fracture.

Outlook

The symptoms of spondyloarthritis may either worsen, stabilise at any stage of the disease, or go into remission. The course of the disease is thus unpredictable. Symptoms may come and go at any time. However, unless there is a major flare, most people are able to carry out activities of daily living normally if the disease remains under control.

In more extreme or long-term cases, damage of the joints and bones can lead to fusion of the joints in the spine or other areas, which can subsequently affect walking and function. As spondyloarthritis is a chronic disease, long-term follow up by a doctor is recommended.

Specialist services available at the following institutions:
 • Singapore General Hospital Tel: 6321 4377

Osteoporosis

Osteoporosis is a condition that causes thinning and weakening of bones. Brittle bones are more prone to fractures. These fractures may happen even with very minimal trauma. Although any bone can be affected, the fractures typically occur in the hip, spine and wrist.



Worldwide, 200 million women suffer from osteoporosis and a woman's risk of hip fracture is the same as her combined risk of developing breast, uterine and ovarian cancer. In Singapore, the number of osteoporosis-related hip fractures in

women over 50 years is 8 times more than that of breast cancer cases.

Who is at risk?

Although women 50 years or older are most at risk for osteoporosis, younger women and men can also be affected.

Peak bone mass is attained by the age of 30. After that, bone mass gradually decreases. In pregnant and lactating women, the pace of bone loss will temporarily increase if the increased calcium demands of pregnancy or breastfeeding are not met by increased dietary intake of calcium. In women, there is also a significant decrease of bone mass in the immediate period following the onset of menopause.

Risk Factors

Risk factors can be divided into those that can be changed and others that cannot.

RISK FACTORS THAT CANNOT BE CHANGED

- Age – The risk for osteoporosis increases as one gets older
- A woman who has gone through menopause - After menopause, the body produces less estrogen, estrogen protects the body from bone loss
- Family history of osteoporosis or osteoporosis-related fractures
- Slender body frame (small bone structure)
- Race – A person of Caucasian or Asian ancestry is more at risk
- Low bone mass or osteopenia
- Previous fracture following a low level trauma, especially after age 50

RISK FACTORS THAT CAN BE CHANGED

- Smoking – Don't smoke as smoking causes bone loss and early menopause
- Excessive alcohol consumption– excessive amounts of alcohol not only reduce bone formation, it also affects the body's ability to absorb calcium
- Sedentary lifestyle

OTHER CAUSES OF OSTEOPOROSIS

- Medications: Using some medications long term can damage bone. These include corticosteroids to treat chronic conditions such as asthma, rheumatoid arthritis etc, medications that lower sex hormones, some anti-seizure medications and sometimes thyroid hormone when prescribed in high doses. Talk with your health care provider about the medications you take
- Other causes: Various conditions can interfere with calcium absorption and contribute to bone loss. These include liver or kidney disease, diabetes, hyperthyroidism (overactive thyroid), Cushing's disease (in which the body produces excess cortisol) and conditions like anorexia nervosa

Symptoms

Osteoporosis is called the 'silent disease' because bone loss occurs without symptoms and is painless. The condition often is not detected until it is quite advanced. Some signs in the advanced stages may include

- fracture of the hip, spine and wrists
- back pain
- loss of height over time



Diagnosis

Osteoporosis can be detected through a Bone Density Test most commonly done using a DEXA scan. The test can determine if you have osteoporosis by measuring the bone mineral density or bone strength at the hip and spine.

The test is quick and painless and is similar to having an x-ray taken but uses much less radiation.

Who should be tested?

- Early menopause before 45 years
- Had previous fracture from fall
- Immediate family member with osteoporosis
- Thin or underweight
- Frail as a result of long term illness
- Women with conditions associated with osteoporosis such as rheumatoid arthritis
- Prolonged use of corticosteroids or thyroid medication

Prevention:

- Engage in regular weight-bearing exercise. Do so at least 3 times a week, but it is important to avoid exercise that can injure weakened bones. Patients who have not exercised before or suffer from medical problems should consult their doctor first.
- Diet - Get enough calcium, vitamin D and phosphorus either through food or supplements. An adult under 50 needs 1,000 mg of calcium daily. Adults over 50 need over 1,200 mg of calcium daily.

Vitamin D is needed by the body to absorb calcium. Vitamin D can either be obtained through the skin from exposure to sunlight or through diet.

An adult under 50 years needs 400-800 IU of Vitamin D daily while adults over 50 needs 800-1000 IU of Vitamin D daily.

If you have difficulty getting the calcium and vitamin D that you need from your diet, you can take supplements.

Treatment

Although there is no cure for osteoporosis, several treatments are available that can prevent further bone loss and improve bone strength. This can significantly reduce the risk of fractures. Medication, exercise and nutrition all play a role in treatment.

Medication

Currently most of the approved osteoporosis medications are known as 'antiresorptive' agents because they stop resorption (or depletion) of bone mineral from bones. Medicines that can stimulate bone formation are also available. Your physician can help you decide which treatment is best for you.

If you are diagnosed with osteoporosis, your physician may recommend one of the following medications: Bisphosphonates that include agents like Alendronate (Fosamax[®]), Risedronate (Actonel[®]), Ibandronate (Bonviva[®]) and Zoledronic Acid (Aclesta[®]). Selective

Estrogen Receptor Modulators such as Raloxifene, Nasal Calcitonin (Miacalcin[®]), the newer agent Strontium (Protos[®]) that may have a double action of stopping bone resorption and stimulating bone formation or the anabolic (bone forming) medication Teriparatide (Forteo[®]) that is given as a daily injection. Denosumab (Prolia[®]) is a relatively new medication, a fully human monoclonal antibody that is given as a 6-monthly injection, for the treatment of osteoporosis. It is important to note that the choice of drug therapy can be complex. Your treatment will be tailored for you.



Specialist services available at the following institutions:
 • Singapore General Hospital Tel: 6321 4377

Spine

Most types of neck and back pain arise from the muscles around the spinal column, and may be due to poor posture or previous injury.

Causes & Symptoms

In younger patients, the sudden onset of neck or back pain may be due to a 'slipped' intervertebral disc. The intervertebral discs are found between the individual bones (vertebra) of the spinal column, and act to facilitate movement of the spine and also as 'shock absorbers' to cushion the transmission of weight down the spinal column.

'Slipped' discs may press on surrounding nerves and result in pain, numbness and/or weakness in the arms and legs. When present in the legs, these symptoms are commonly referred to as 'sciatica' or 'lumbago'.

In older people, degenerative changes in the spine may lead to arthritis of the spine, and this may be a cause of pain. In some cases, bone spurs can press on surrounding nerves or even on the spinal cord, leading to pain, numbness and/or weakness in the arms and legs.

Diagnosis

Most cases of neck and back pain can be managed with rest, medication and strengthening exercises. Your family doctor will be able to advise you on the proper care, but in cases of persistent pain or suspected slipped disc, he or she may refer you to an orthopaedic specialist for a more thorough check-up.

In most cases, standard x-rays will be ordered and in some cases special nerve function tests. When a more serious problem is suspected or when surgery is being considered, you will normally be sent for Magnetic Resonance Imaging, or MRI. This is a sophisticated way of imaging the spine and is very accurate, and it has the further benefit of being without any radiation as it is performed with the assistance of a magnetic field.

Other less common but serious causes of neck and back pain include infection and cancer and in some of these, other special investigations may be needed for the diagnosis.



Treatment

The exact treatment depends on the cause of the pain, but generally in mild cases you will be advised on:

- **Lifestyle and posture modifications.** This may include advice on how to perform manual tasks such as lifting loads to minimise spine injury, and also how to optimise your posture when working and sleeping.
- **Physiotherapy.** For many patients, a programme of supervised physiotherapy will be helpful in alleviating neck/ back pain and maintaining proper spine health. Treatment will normally begin with

measures to relieve pain such as traction and heat therapy, followed by exercise programs to improve the strength and stamina of spinal muscles.

- **Medication.** There is no medication that can cure neck and back pain, but medicines can be used to relieve pain, reduce inflammation, decrease spasm and soothe nerve ('neuropathic') pain while physiotherapy is progressing.

When will I need surgery?

Surgery is advised when nerve compression is severe and there is a risk of permanent nerve damage, and when symptoms are persistent and disabling despite maximal non-surgical management. There are many types of surgery available for the various causes of spinal disorders, but some of the more common procedures include:

- **Discectomy for removal of prolapsed ('slipped') discs.** In the lower back (lumbar spine), this can also be achieved via minimally-invasive surgery which can potentially lead to quicker recovery and a short hospital stay.
- **Spinal fusion.** In some patients, back pain is due to instability of the spinal column which can be due to

degenerative changes in the spine. In such cases, your specialist may advise that the unstable portions of the spine be joined together so as to limit abnormal movements and thus reduce pain. Such procedures are currently normally performed with special rods and screws to increase the success rate of the procedure.

- **Vertebroplasty and kyphoplasty.** In older patients who are suffering from persistently painful osteoporotic fractures of the lower back vertebrae, these relatively simple procedures have proven to be useful in relieving pain and improving mobility. In both procedures, a special bone cement is injected into the fractured vertebra to stabilise it, but in kyphoplasty, the fractured vertebra is also expanded using a special balloon device before the cement is injected.

Minimally Invasive Spine Surgery

Spine surgery is commonly undertaken for back and/or leg pain due to:

- 'pinched nerves' in back (due to either a 'slipped disc' or bone spurs)
- mechanical instability of the

spine where one bone of the spine moves abnormally over its neighbour (due to degeneration of spine and spondylolisthesis)

In the first case, surgery is aimed at decompressing the affected nerves by removing the 'slipped disc' or bone spurs. For the latter, surgery is aimed at stabilising the spine by fusing the spine (by applying bone chips between the affected segments and using screws and rods to hold the segments together).

While traditional spine surgery is good at achieving these aims, the recovery process is painful and can be prolonged due to the damage to the muscles and their nerve and blood supply in the process of exposing the spine. A long skin incision is usually required for the exposure and the muscles pulled apart to aid visualisation.

Benefits

Advancement in technologies and techniques allows the same surgeries to be performed via smaller incisions. The same aims can also be achieved just as safely while minimising damage to the muscles. The overall benefits are shorter hospitalisations; as short as one day for



decompression surgery and two days for fusion surgery and quicker return to functions and work.

In this technique, x-rays are used to guide the insertion of tubes to reach the spine and visualisation is achieved with the use of a microscope and special cameras. The nerves are decompressed with specially modified instruments. If necessary, screws and rods are inserted under x-ray guidance.

Who it is for

Such surgeries may be suitable for patients with low back pain and/or leg pain that interferes with normal activities and work; and for which other treatments such as physiotherapy and medication are not working.

The orthopaedic surgeon will have performed a thorough examination of your back and nerves, including x-rays and MRI scans, before deciding on whether such an operation is suitable for you and which surgery is more appropriate for your specific condition.

Specialist services available at the following institutions:

• Singapore General Hospital Tel: 6321 4377

National Neuroscience Institute Tel: 6357 7095

Knee

Knee injuries, especially amongst sportsmen and older adults, are a common reason why people visit the orthopaedic specialist. Common knee injuries are ligament sprains, cartilage tears, overuse injuries and arthritis.

Ligament Injuries

There are 4 ligaments, tough bands of tissues, in the knee that stabilise the joint. The most commonly injured ligament is the anterior cruciate ligament (ACL).

Preventing abnormal sideways motion of the knee are the collateral ligaments, the medial collateral ligament (MCL) and the lateral collateral ligament (LCL), which are located on the inside and outside respectively of the knee.

1. Anterior Cruciate Ligament (ACL)

CAUSES

The ACL is the most commonly injured ligament of the knee. It is usually injured in rapid or abnormal twisting motion such as when the knee stops or changes directions suddenly. The ACL can also be injured when the knee twists on landing or as a result of a direct contact or collision such as during a soccer tackle.

SYMPTOMS

- Immediate pain right after injury
- Swelling of the affected knee within 4 to 12 hours
- A popping sound when the ligament ruptures
- Difficulty with knee movement
- Walking with a painful limp
- Feeling of instability, with the knee giving way during sports or daily activities

2. Posterior Cruciate Ligament (PCL)

CAUSES

Injury to the PCL occurs when direct force is applied to the front of the knee when the knee is bent, such as when the bent knee hits the dashboard in a car accident. The ligament may also be pulled or stretched in a twisting or hyper-extension injury.

SYMPTOMS

- Initial pain and swelling right after the injury
- Pain in the front or inner side of the knee
- Instability not a major complaint unless there is injury to other ligaments

Diagnosis for ACL and PCL Injuries

Diagnosis is usually made on history and clinical examination. An x-ray of the knee will rule out associated fractures. An MRI may also be ordered to rule out other injuries to the meniscus or cartilage.

3. Collateral Ligaments

Injuries to the collateral ligaments, like the medial collateral ligament (MCL) and lateral collateral ligament (LCL), are usually caused by a direct blow to the side of the knee or a twisting injury. It may occur in isolation or together with ACL or PCL injuries.

Diagnosis is usually made on history and clinical examination. Symptoms include pain and swelling at the site of injury and the knee may feel unstable.

Treatment for Ligament Injuries

Treatment for ligament injuries includes rest, elevation and ice therapy of the affected limb. Crutches to take some weight off the knee and braces to support the knee may also be prescribed.

Physiotherapy to strengthen the supporting muscles and increase the range of motion will normally be part of the treatment.

Depending on your situation, your doctor may recommend you undergo surgery for ligament repair or reconstruction.



Meniscal Injuries

The meniscus acts as a shock absorber during weight-bearing activities and helps to maintain knee joint stability. It is a commonly injured part of the knee.

CAUSES

A meniscus tear can be caused by contact or non-contact activity when a weight-bearing knee moves or twists suddenly. It can also occur as a result of wear and tear.

SYMPTOMS

- Knee pain
- Swelling of the knee
- Locking of the knee
- Inability to straighten or bend the knee fully
- Difficulty walking due to pain

DIAGNOSIS

Diagnosis is made after your doctor takes your case history and clinical examination.

A MRI may also be useful for diagnosing tear/s of the meniscus.

TREATMENT

Non-surgical treatment includes rest, elevation and ice therapy of the affected limb.

Crutches can help take the weight off the affected limb, and physiotherapy, after the pain subsides, can help improve the range of motion and strengthen the muscles around the knee.

If the meniscus does not heal by itself, surgical repair or debridement of the meniscus may be needed if you continue

to experience persistent pain, locking of the knee or are unable to achieve full range of motion.

Articular Cartilage Injuries

The articular cartilage is the smooth covering at the end of the bones that allows for frictionless gliding of one bone against another. It also acts as a shock absorber.

CAUSES

The surface can be damaged by direct trauma or through chronic wear and tear.

SYMPTOMS

- Recurrent pain
- Swelling of the knee
- May experience difficulty straightening or bending the knee
- There may be audible 'clicks' on knee movement

DIAGNOSIS

An x-ray and MRI may be useful in the diagnosis.

TREATMENT

Rest, ice and compress should be the first course of treatment upon injury.

physiotherapy, when the pain subsides, to strengthen the muscles and for range of motion.

Medications such as non-steroidal anti-inflammatory drugs are useful for pain relief and reducing inflammation.

Surgical Options

As the ability of the cartilage to heal by itself is limited, your surgeon may recommend that you undergo resurfacing procedures. Some of the surgical options include:

- Arthroscopic microfracture techniques to help fill the defect with blood clot and stem cells
- Osteochondral autograft transfer techniques where plugs of cartilage, together with its supporting bone foundation, are taken from a less critical part of the knee and transplanted to cover the defect
- Autologous cartilage implantation techniques where cartilage cells are harvested from the knee, grown and multiplied in the laboratory, and subsequently implanted back into the joint to cover the defect

Knee unloader brace can be used to relieve the stress in the knee, followed by

Knee cap injury

PATELLO-FEMORAL PAIN SYNDROME (PFS)

PFS is a common cause of knee pain. It is an overuse injury common amongst runners, jumpers, and other athletes such as skiers, cyclists, and soccer players who put repetitive stress on their knees.

CAUSES

Structural alignment and muscle weakness or imbalance may cause the patella (kneecap) to track improperly on the femur (thigh bone) during movement. This results in excessive wear and tear on the undersurface of the kneecap in contact with the thigh bone leading to pain around the kneecap.

SYMPTOMS

- Pain behind kneecap or front of the knee
- Pain is worsened by activities that involve knee bending such as running, squatting or climbing of stairs
- There may be swelling of the knee
- Sensation of grinding and audible crepitus may be present

DIAGNOSIS

Diagnosis is usually made on history, and clinical examination and x-ray of the knee may be useful to assess the position of the kneecap and to rule out other conditions.

TREATMENT

Treatment includes avoiding activities that will place more stress on the knee and medication to reduce pain, swelling and inflammation. Physiotherapy, when the pain lessens, may be recommended particularly exercises to strengthen quadriceps muscles.

Other non-surgical treatments include the use of a knee support or brace during sports participation. You may return to your usual level of exercise and sport gradually.

Your surgeon may explore the option of surgery should your symptoms not improve.



Tendon injuries and disorders

PATELLAR TENDINITIS

Patellar tendinitis is an injury that affects the tendon connecting your kneecap (patella) to your shinbone. The patellar tendon helps your muscles extend your lower leg so that you can kick a ball, pedal your bicycle and jump up in the air.

CAUSES

Commonly known as jumper's knee, patellar tendinitis is most common in athletes whose sports involve frequent jumping, running or kicking.

Patellar tendinitis is a common overuse injury as a result of repeated stress on your patellar tendon. The stress results in

tears in the tendon that as they become more numerous, causes inflammation in your tendon.

SYMPTOMS

- Pain is the first symptom of patellar tendinitis. It worsens with physical activities
- Pain is usually relieved with rest but may be persistent in severe cases
- Swelling may be present

DIAGNOSIS

Diagnosis is usually made on history and clinical examination.

TREATMENT

The conservative approach to treating patellar tendinitis aims to reduce strain on your tendon and to gradually build up the tendon's strength.

Your doctor may suggest that you avoid running and jumping and recommend physiotherapy to stretch the tendon and quadriceps with the aim to returning to your previous level of intensity in your exercise. Medications to reduce pain, swelling and inflammation may also be given.

A patellar tendon strap that applies pressure to your patellar tendon to distribute force away from the tendon may be given to relieve pain.

Osteoarthritis of the Knee

Osteoarthritis (OA) of the knee is the most common type of OA and a common cause of disability. Early diagnosis and treatment can help to manage the symptoms of knee OA. (For symptoms and diagnosis refer to section on Osteoarthritis – Page 9).

TREATMENT

For the treatment of knee OA, your doctor may sometimes recommend a steroid injection into or around the joint. The pain relief is usually only temporary, and your doctor will limit the number of steroid injections that you can receive.

Another type of injection therapy is called visco-supplementation. This involves the injection of hyaluronic acid derivatives into the joint. Hyaluronic acid is a normal component of joint fluid. However, the response to hyaluronic acid injection, as with steroid injection, is variable and usually temporary.

SURGERY

Surgery is usually only offered for severe cases that have not responded to the other forms of therapy (see section on Osteoarthritis). Both the type of surgery and the decision for surgery are made following careful discussions between you and your doctor.

Some of the more common types of surgery include:

- **Arthroscopy** This is suitable for early OA of the knee, and is considered a minor procedure during which the

orthopaedic specialist uses an 'arthroscope' to look inside the joint.

This is a form of 'keyhole surgery'.

During the procedure, the surgeon will be able to clean up damaged portions of the joint, or stimulate repair in areas where the cartilage has been lost.

- **Osteotomy** This procedure is suitable for younger patients (less than 60 years old) with limited OA of the knee. During this procedure, the bones around the joint are cut to allow the alignment of the joint to be corrected. Symptom relief can sometimes be achieved for up to 10 years following this procedure.
- **Joint replacement** In late stages of OA, the joint has become so damaged that the best treatment is to replace the joint with an artificial one, which is typically made of a metal alloy together with a plastic component. The entire joint may be replaced (total joint replacement), or if OA is limited to only one part of the joint, then the surgeon may choose to only replace that part (unicompartmental/ partial joint replacement).

Specialist services available at the following institutions:

- Singapore General Hospital Tel: 6321 4377

Shoulder and Elbow

The shoulder and elbow are commonly injured parts of the body. Elbow injuries usually result from overuse while the shoulder as one of the most moveable, yet unstable joints, is a site of many injuries.



Frozen Shoulder

Frozen shoulder is a condition that results in loss of motion and pain or stiffness in the shoulder. The pain and loss of movement can be so severe that the performance of daily activities can become difficult.

Also known as adhesive capsulitis, it most commonly affects adults between the ages of 40 and 60 years.

CAUSES

Inflammation. Inflammation causes parts of the joint capsule in the shoulder joint to become fibrotic, reducing the volume of the shoulder joint, limiting the shoulder's ability to move and causing the shoulder to freeze.

No obvious cause. Frozen shoulder can happen with no obvious cause, which is known as primary frozen shoulder.

RISK FACTORS

Primary frozen shoulder is associated with several risk factors, including:

Age & Gender. It tends to affect adults over 40 years and is more common in women.

Diseases & Illnesses. Frozen shoulder also tend to occur more frequently in

patients with endocrine disorders such as diabetes, cardiac disease or thyroid problems, Parkinson's disease or if you have undergone surgery.

Immobility. In secondary frozen shoulder, this can occur commonly after prolonged immobilisation of the shoulder after injury, or due to pain that limits shoulder motion (such as after injury to the rotator cuff muscles of the shoulder) eventually leading to this disease.

SYMPTOMS

The most obvious symptoms are shoulder pain and a limited range of motion in the shoulder.

You may also have difficulties moving the shoulder normally and engaging in daily activities such as reaching across the table, putting on a shirt and overhead motions like combing the hair. Motion is also limited on both passive and active motion.

Often, in the early stages, pain is a predominant symptom, and can affect sleep.

There are 3 stages of a frozen shoulder, namely:

- Freezing stage (Stage 1). This is the painful stage and motion of the

shoulder is limited. This stage normally lasts 6-12 weeks.

- Frozen stage (Stage 2). The pain eases in this stage but the stiffness remains. This stage generally lasts 4 to 6 months.
- Thawing stage (Stage 3). In the final stage, the motion in the arm gradually improves over a long period. This stage can last more than 1 year.

DIAGNOSIS

A frozen shoulder can be diagnosed on the basis of medical history and clinical examination. An x-ray or MRI can be used to rule out other causes such as arthritis and rotator cuff tears.

TREATMENT

The initial aim of treatment for frozen shoulders is to reduce pain and inflammation as well as increase the range of motion of the shoulder. The course of treatment normally includes medications such as anti-inflammatory drugs. An injection of steroids to reduce the inflammation can sometimes be performed. Physical therapy is most useful in restoring full range of motion to the shoulder.

If the frozen shoulder does not respond to non-surgical treatment, then surgery to release or stretch the scar tissue is

an option. The most common methods include manipulation under anaesthesia and shoulder arthroscopy:

Manipulation, under anaesthesia, allows the surgeon to move the arm to break up the adhesions. No incisions are made.

In shoulder arthroscopy, a small camera and instruments are inserted through the small incisions made around the shoulder to cut through the tight portions of the joint capsule. Physiotherapy must follow the surgery to minimise the chance of the frozen shoulder returning.

Rotator Cuff Injuries

The rotator cuff comprises a group of 4 muscles that function to stabilise and move our shoulders. Though the rotator cuff muscles are extremely important structures in the shoulder, they are also prone to tears and weakening.



A rotator cuff injury, which is fairly common, involves any type of irritation or damage to your rotator cuff muscles or tendons. The risk of injury increases with age, and is particularly common in middle-aged persons.

CAUSES

Normal wear and tear. As the tendon of the rotator cuff has poor blood supply, it tends to be prone to degeneration due to ageing. The degeneration can be aggravated by repetitive shoulder movements. Hence this condition typically occurs if you are above 40.

Repetitive movements. Athletes who regularly use overhead repetitive movements such as swimmers, rowers or tennis players are at higher risk of rotator cuff injuries. However, the injury can also happen through seemingly trivial activities like carrying a heavy load, lifting things overhead or hanging the clothes out.

Trauma. The rotator cuff can also be damaged from a single traumatic injury such as a fall or a hard direct hit to the arm.

Heavy lifting or pulling. Lifting or pulling an object that is too heavy or lifting in the wrong way can cause the strain or a tear to the rotator cuff muscle or tendon.

Poor posture. Slouching forward of the head and neck can cause the muscle or tendon to be pinched leading to inflammation.

SYMPTOMS

In many people with underlying rotator cuff injury, they can often have no pain or limitation of motion though they can have inflammation or early injury to their rotator cuff resulting from degeneration with chronic overuse from repeated usage. These patients often present only after an injury, like a fall which causes a tear in the already injured rotator cuff.

When there is a tear in the rotator cuff, the most common symptom is pain in the shoulder especially when lifting the arm. Pain may be experienced when you reach up to comb the hair, or bend the arm back to wear a piece of clothing.

You can also experience weakness, and tenderness in the shoulder and pain when sleeping on affected arm. The shoulder can also experience a loss of range of motion. With a large tear, there can be continuous pain and muscle weakness.

In cases of a complete tear of the rotator cuff, there is likelihood that you may completely be unable to lift the arm.

DIAGNOSIS

Diagnosis of a rotator cuff tear is based on history and clinical examination. X-rays may be useful in determining if there are other contributing factors such as previous bony injury.

An ultrasound or MRI will show if a tear is present as it can identify all rotator tears from degeneration to partial or complete tears.

TREATMENT

Generally, pain relief medication would be the first line of treatment. A steroid injection can be given to relieve pain and inflammation.

Physiotherapy is recommended to increase shoulder muscle strength and improve flexibility.

Surgical options include arthroscopic or key-hole repair. The torn edge of the cuff is removed and mobilised. The tendons are reattached to the bone using absorbable or metal anchors using the latest technique available. Traditional open repair of the rotator cuff can also be performed. After surgery, patients are put in a sling or brace. Therapy starts the day after surgery.

Stiff Elbow

The elbow is a joint that is easily complicated by stiffness after injury or disease. This is because the elbow actually comprises 3 separate joints that fit extremely well together, and is in close proximity to a host of soft tissue structures.

CAUSES

Post-Injury stiffness. The most common cause in our population is post-injury stiffness of the elbow.

Other diseases. A stiff elbow joint can also arise due to other diseases like infection and auto-inflammatory conditions (for example, rheumatoid arthritis).

Congenital problems. Certain congenital problems may also present with elbow stiffness.

Risk Factors

Prolonged immobilisation. Patients with prolonged immobilisation of the elbow joint due to injury or illness are at highest risk of developing elbow stiffness.

Damage to joint. Diseases like infection that lead to damage of the joint surface (also known as the articular cartilage) also predispose to elbow stiffness.

SYMPTOMS

You will experience limited range of motion in the elbow when bending the elbow, and sometimes in forearm rotation as well. Pain may or may not be an associated symptom depending on the underlying problem.

DIAGNOSIS

You should seek medical treatment when you sustain injuries to the elbow that results in severe pain and swelling. Often, seeking traditional forms of treatment without prior evaluation with x-rays to exclude fractures can lead to long term damage of the elbow joint, pain and stiffness.

If you experience spontaneous onset of elbow pain without any prior history of trauma, you should seek medical advice to rule out any serious elbow disease, as delays in treatment may lead to a poorer outcome.

TREATMENT

The exact treatment for elbow stiffness depends on the underlying cause, and the extent to which the elbow joint itself and its surrounding soft tissue structures are affected. Generally, the treatment of elbow stiffness hinges on the use of splints, exercises, and judicious surgery. Surgical release of the stiff elbow may

sometimes be used if conservative methods fail, or if these measures are unsuitable.

Prevention

In patients with elbow injury, stable fixation of fractures and early mobilisation is the best form of prevention of elbow stiffness. In diseases which can result in articular cartilage damage, early and effective treatment to control the disease and limit articular cartilage is needed to minimise long term elbow stiffness.

Tennis Elbow/Lateral Epicondylitis

Tennis elbow is a common condition in adults in their 40s and 50s. Known formally as lateral epicondylitis of the elbow, it is more commonly known as tennis elbow. While most commonly associated with tennis (10% to 50% of regular tennis players experience it during their playing careers), hence its name, it can occur in any sport or work that requires forceful and/or repetitive forearm usage.

CAUSES

Tennis elbow occurs due to a small tear/ microtear in the tendon(s) on the

outside of the elbow (lateral side) that attach the forearm muscles to the elbow joint (lateral epicondyle). Repeated tears leads to the development of damage in the tendon known as angiofibroblastic hyperplasia. The microtear and subsequent development of the damaged tissue is due to forceful and repetitive forearm use.

SYMPTOMS

Pain and tenderness over the lateral epicondyle (elbow joint), often radiating down the forearm. Pain is worse on resisted wrist and finger extension with the elbow in full extension. Initially, symptoms may be activity related but in chronic cases, the pain and tenderness may become constant.



RISK FACTORS

Age. You are at higher risk if > 40 years.

Activity. Regular tennis of more than 2 hours playing time each session, or a similar activity.

Technique. Tennis players with poor stroke technique (hitting the ball with a flexed elbow) and improper grip size.

Other factors. Hard court players are more likely to develop a problem compared to those who use other surfaces.

DIAGNOSIS

When the pain and tenderness becomes frequent, and recurs despite adequate rest and analgesics, you should seek medical advice.

Diagnosis of this condition is essentially made on clinical signs and symptoms. X-rays are done more to evaluate the bone surrounding the muscles and to exclude other potential causes of pain. It may also reveal calcification or the development of bone spurs of the lateral epicondylar region in chronic cases.

TREATMENT

Generally, a period of observation with conservative management of at least 6 month's duration is recommended. Conservative management includes activity modification, correction of playing technique in sports, improved ergonomics in work-related tennis elbow, analgesics, stretching exercises, counterforce bracing and topical injections of steroids.

Failure of a trial of conservative management may require surgery to treat symptoms. There are various surgical options available, including open release of the affected tendon with excision of the damaged tissue, arthroscopic release, and newer techniques that stimulate improved blood supply to the affected area.

Prevention

Make sure that you have adequate warm up exercises and stretching before any strenuous or repetitive activity to the forearm. Also limit continuous duration of play or activity, and use correct technique. The proper sizing of racquets is important.

Specialist services available at the following institutions:
 • Singapore General Hospital Tel: 6321 4377

Hip

Hip Osteoarthritis (OA) is a common form of osteoarthritis. It affects the hip joint very much the same way it affects the knee. Hip dysplasia and Femoro-Acetabular Impingement (FAI) are precursors to osteoarthritis.



Causes

OA of the hip can be caused by a hip injury earlier in life. Changes in the alignment of the hip, e.g. after a fracture inside the hip joint or of the surrounding bones, can lead to uneven weight

distribution through the hip joint. This eventually leads to accelerated 'wear and tear' of the joint.

Some people are born with an abnormality in the shape of the hip joint. This is known as developmental dysplasia of the hip (DDH). Severe cases of DDH are usually detected from birth or early in life, but milder forms of DDH may only begin to cause discomfort in adult life.

Hip dysplasia is when a shallow acetabulum (socket) results in under-coverage of the femoral head (ball), resulting in greater forces or pressure over a smaller area of cartilage and labrum. Femoro-acetabular Impingement (FAI) occurs when abnormal bone development results in impingement between the femoral neck and the acetabulum. Both these conditions may result in labral tears, cartilage wear, and accelerated osteoarthritis.

Avascular necrosis (AVN) is another cause of degeneration of the hip joint. In this condition, the femoral head (the ball portion of the femur, or thigh bone) loses a substantial portion of its blood supply and begins to die. The dying femoral head is unable to withstand the large forces that are transmitted through the hip joint during even normal activities like walking and climbing stairs, and becomes increasingly deformed.

AVN has been linked to alcoholism, fractures and dislocations of the hip, and long-term steroid treatment for other diseases. In some cases, no cause can be identified. Early cases of AVN can usually be diagnosed using Magnetic Resonance Imaging (MRI) of the hip joint.

Symptoms

The most common symptom is pain while putting weight on the affected hip, such as during walking, squatting or even sitting for prolonged periods of time. The pain is typically felt in the groin area or buttocks, or sometimes over the front of the thigh.

You may limp, which is the body's way of reducing the amount of force that the hip has to withstand. Your hip may also feel stiff, and this will cause difficulty with certain activities such as getting into or out of a low chair or a car, or using the toilet.

You may also experience difficulties with crossing over low obstacles on the ground. Finally, as the condition becomes worse, pain may be present all the time and may even keep you awake at night.

Diagnosis

The diagnosis starts with a complete history and physical examination by your doctor. X-rays will be required to determine the extent of the joint damage and can also help the doctor find a possible cause for it.

Other tests may be required if there is reason to believe that other conditions are contributing to the degenerative process. Magnetic resonance imaging (MRI) may be necessary to determine whether your hip condition is from problems with AVN. Blood tests may be required to rule out other forms of arthritis or infection in the hip.

For younger patients, MRI is frequently required to assess the labrum and cartilage, as well as to look for signs of FAI.

Treatment

NON-SURGICAL TREATMENT

Hip OA cannot be cured, but therapies are available to relieve discomfort and to control the degeneration of the joint.

Your doctor may prescribe medicine to help control your pain. Physical therapy plays a critical role in the nonsurgical management of hip OA. A primary goal is to help you learn how to control symptoms

and maximise the function of your hip. You will learn ways to calm pain and symptoms, which might include the use of rest, massage and heat therapy. A walking stick or walking frame may be needed to reduce pressure on the hip when walking. Range of motion and stretching exercises will be used to improve hip motion. You will be shown strengthening exercises for the hip to steady the joint and protect it from further injury. Your therapist can suggest tips for getting your tasks done with less strain on the joint.

SURGERY

Hip dysplasia and FAI are a result of development abnormalities that happen in the early years of life, and appropriate treatment in early adult life may delay the progression of OA and thus prevent or delay the need for an artificial hip replacement.

ARTHROSCOPY ('KEYHOLE SURGERY')

Surgeons can use an arthroscope to look inside the hip joint to check its condition. An arthroscope is a miniature television camera inserted into the joint through a small incision.

For patients with FAI and labral tears, surgery involves removing the offending abnormal bone, and

and repairing or reconstructing the labrum to restore a more normal anatomy, thus delaying the progression of osteoarthritis. Cartilage procedures may also be performed at the same setting if required.

PERIACEABULAR OSTEOTOMY (PAO)

PAO is recommended for young patients with hip dysplasia. It involves osteotomies and re-orientation of the acetabulum to increase the coverage of the femoral head, thus increasing the area that is loaded and reducing the forces or pressure on the labrum and cartilage, which will delay the progression of osteoarthritis. This should be done for a young patient before the onset of advanced hip OA.

ARTIFICIAL HIP REPLACEMENT

An artificial hip replacement is the ultimate solution for advanced hip OA. This is the definitive treatment for severe hip OA, and is both safe and very effective.

Specialist services available at the following institutions:

• Singapore General Hospital Tel: 6321 4377

Foot and Ankle

The foot and ankle bears the stress of our body weight as we go about our daily activities. This stress is relentless. As we walk over uneven ground, it allows us to accommodate to the undulation, further adding stress to the numerous joints in the foot.



Fashionable footwear has further added problems as women squeeze their feet into shoes of all shapes and sizes. Sporting injuries and fractures are also very common in the foot.

The critical thing about the foot is that an injury or abnormality in one joint, can rapidly cause additional injuries to its neighbouring joints due to the close proximity and relationships. Hence, prompt diagnosis and appropriate management is crucial to having a good outcome.

Causes

The main causes of chronic foot pain are either degenerative or arising from a previous injury.

Painful degenerative problems can affect the joints of the foot, or the tendons or fascia (soft tissue). Some common diagnosis will include plantar fasciitis, hallux valgus, collapsed arches in adults, osteoarthritis of the small joints or the ankle.

Injuries of the foot and ankle can arise from sports or normal daily activities. Occult fractures can occur or the soft tissues can be damaged. The soft tissues refer to ligaments and fascia which hold the bones together, or the tendons which moves the bones. They can be stretched, torn or dislocated.

Diagnosis

Generally, an Orthopaedic consult would include radiological investigations. Your surgeon will order the appropriate x-rays.

Occasionally specialised investigations like Computer-Tomography (CT) scans, Magnetic Resonance Imaging (MRI), or ultrasound scans may be needed. Some investigations are better meant to look at the bones and joints, and others to look at the soft tissues. Sometimes, you may be required to undergo some blood tests to rule out especially, inflammatory arthritis.

Treatment

As in most degenerative problems, the initial management can include a period of rest, change of activities and anti-inflammatory medications. Finding a pair of shoes that helps to relieve the pain is also useful. Most family physicians can adequately manage the majority of such conditions conservatively.

If a period of rest or oral anti-inflammatory medications does not adequately relieve the pain, then a referral to the orthopaedic surgeon might be necessary.

Having made the proper diagnosis, your surgeon will discuss with you, the options available. If you have tried conservative options but have had no relief of symptoms, you might be offered surgery.

Surgery

Surgery can range from key-hole or arthroscopic surgery, to major deformity corrections. Painful deformities can be reliably corrected via osteotomies (bone re-shaping) without sacrificing or fusing any joints. With modern internal fixation devices, the outcome of surgery has improved and patients can expect to move about fairly conveniently.

In advanced deformity with arthritis, fusion might have to be done. This will mean that the diseased joints are permanently held together and movement is sacrificed. These are usually salvage procedures for end stage diseases. Therefore, early diagnosis and treatment might allow us to avoid this. In the ankle however, advanced osteoarthritis can be treated with total ankle replacement. This involves implanting an artificial ankle joint.

Soft tissue injuries can variably be treated by surgical repair or by transplanting healthy soft tissue to the damaged area (reconstruction). Common procedures performed would be ligament reconstruction of an unstable ankle and arthroscopic (key-hole) ankle surgery to resect painful soft tissue impingement at the ankle.

Specialist services available at the following institutions:

• Singapore General Hospital Tel: 6321 4377

Orthopaedic Problems In Children



Conditions of the Feet

Many parents are concerned with the normal development of their children's feet making them amongst some of the most common conditions that doctors see. Some may be part of growing up and will usually self-correct. Others require treatment that may range from something as simple as special shoes to surgery.

Some of the more common conditions of the feet that we see are:

- Flatfeet
- Clubfeet
- Abnormally shaped feet
- Curly toes
- Ingrown toenail
- Extra or missing toes
- Lumps and bumps over the foot
- Foot pain

A doctor will be able to help differentiate between these conditions and advise treatment in a timely manner.

Conditions of the Legs

Parents have many queries on whether the way the child walks is normal and if the placement of the feet during walking is normal. Some of these variants in walking patterns can be part of development yet some may be a sign of growth abnormalities.

The way the leg aligns can also vary with age. But if the alignment is abnormal, early treatment may be required.

Some of the more common conditions of the legs are :

- Bowleggedness
- Knock knees
- Unstable walking
- Walking on the toes (tiptoeing)
- Unequal leg lengths

Conditions of the Hips

Limping is a very common observation in children. Most times, limps are due to excessive activity and do resolve on their own. But at other times, depending on the age of the child, limping more often than not is usually secondary to problems in the hips.

Other than limping, hip conditions can present with different patterns of walking such as in-toeing and out-toeing. These patterns can be a result of normal development or it can be due to some underlying abnormality.

Newborns are also screened for a condition where the hip may be poorly or under developed or even dislocated. This is called Developmental Dysplasia of the Hips.

It is important to diagnose this condition early, as treatment is simple in the early stages, requiring braces or casting. If the chance for early treatment is missed, these children may require more invasive methods such as surgery to remedy it.

Some of the hip conditions that are seen include :

- Developmental Dysplasia of the Hips
- In-toeing
- Out-toeing
- Painful and painless limps in different age groups

Limb Length Discrepancy (LLD) and deformities

LLD or inequality in the lengths of the lower limb is usually a source of concern for many parents. Fortunately most times these difference are so small that they are not apparent clinically and do not warrant any intervention.

However, in a smaller group of patients there can be a significant difference in which case the source needs to be investigated and appropriate treatment instituted.

Some of the conditions that can cause LLD are:

- Hemi hypertrophy –Idiopathic (no known cause) or secondary to increase blood flow to the limb
- Hip conditions – like neglected dislocations
- Arrest of the growth plate secondary to infections and injury to the growing areas of the lower limbs
- Foot condition like clubfeet which causes the affected foot to be smaller leading to a shorter foot height and subsequently a shorter leg



The treatment can range from close observation to the latest intramedullary implants. The treating doctor will decide on the course of treatment based on the cause of the LLD and its response to the various modes of treatment.

Back Pain and Spine Deformity in Children and Adolescents

Spinal conditions, back pain and the evaluation of true or perceived spinal deformity are the most common reasons for parents seeking help at paediatric orthopaedic clinics.

SPINE DEFORMITY IN CHILDREN

The most common spine deformities are scoliosis ('curved' spine), and kyphosis ('hunch-back').

Scoliosis, or a side-to-side curvature of the spine, can affect children and adolescents of all ages. The most common type of scoliosis has a genetic predisposition and tends to affect thin females who are approaching or undergoing their pubertal growth spurt. The exact cause of this type of scoliosis – adolescent idiopathic scoliosis - has yet to be established and continues to be researched worldwide.

Less commonly, scoliosis can also be associated with conditions like Cerebral Palsy, Spina Bifida, Duchenne Muscular Dystrophy and Spinal Muscular Atrophy. It can also be associated with certain clinical syndromes such as Marfan Syndrome and Ehlers-Danlos Syndrome. When one or more vertebrae in the spinal column are imperfectly formed, the resultant scoliosis is termed 'congenital scoliosis'.

Evaluation of a child or teen with scoliosis involves a full clinical examination with particular emphasis on examination of the spine. X-rays of the spine allow the severity of the scoliosis to be measured in degrees; serial x-rays allow any progression to be detected. The pubertal growth spurt is the 'danger period' during which a child's scoliosis may progress significantly.

At KK Women's and Children's Hospital (KKH), the EOS Connect Imaging system provides safe and high-quality diagnostic imaging for children with scoliosis with about one third the radiation dose of conventional X-ray systems.

The goal of treating scoliosis is to prevent its progression. Very mild curvatures require observation only. Children with more severe scoliosis and who have significant growth remaining may require the use of a back brace or orthosis. In some cases surgery may be necessary to arrest its progression.

At KKH, scoliosis surgery is performed by a team comprising of paediatric orthopaedic and spine surgeons supported by full-time paediatric anaesthetists and nurses. Spinal cord monitoring is carried out during the scoliosis surgery to prevent any potential nerve and spinal cord injury.



To improve placement of implants during scoliosis surgery, KKH utilizes machine-vision image guided surgery systems for radiation-free, image-guided spine surgery, which can improve surgical efficiency and accuracy, eliminate need for radiation, and reduce blood loss and operative time.

Kyphosis, or hunch-back, is another cause of great concern among parents. In the majority of cases, this is the result of poor posture. Less commonly, a condition known as Scheuermann's disease can occur in adolescence causing a 'roundback' which can sometimes be quite severe and may require bracing or surgery.

Kyphosis can also be associated with severe scoliosis causing kyphoscoliosis. Other causes such as tuberculosis of the spine are very rare these days.

BACK PAIN IN CHILDREN

As a rule, children should not get back pain. Therefore, back pain that is persistent or severe in children always warrants a thorough evaluation and work-up.

The majority of children and adolescents who experience back pain have acute back strain. This is usually the result of unaccustomed exercise or excessive exercise but may sometimes be due to an injury or poor posture.

Back strain often improves after a few days or weeks following a period of rest. Occasionally, anti-inflammatory medication and a short course of physiotherapy may be helpful. High energy injuries can result in fractures of one or more vertebrae but fortunately this is uncommon.

Children may also be born with a small defect in the spine called spondylolysis. This may occasionally cause back pain especially if it leads to spondylolisthesis when one of the vertebrae slips forwards on the one below.

When back pain in children and adolescents is persistent or associated with fever, lower limb and/or bowel and bladder symptoms, further evaluation is indicated. Back pain that interferes with sleep or that requires pain killers is significant and warrants evaluation. In some cases an infection or a tumour may be causing the pain.

The team of paediatric orthopaedic surgeons at KKH has a wealth of experience in evaluating children with back pain. Any persistent back pain in children should be seen by a doctor for evaluation and treatment.



Sports Injuries

Sports injuries account for a quarter of all injuries to children and adolescents, and the incidence is increasing due to increasing participation in sports at all ages. Prevention of sports injuries is aided by improved education of athletes, coaches and parents with regard to the specific requirements of the sport and the risks involved.

SOFT TISSUE INJURIES

Contusions

From direct trauma with intact skin, results range from haematomas to compartment syndrome in severe cases.

Lacerations

From direct trauma with breach of the skin, commonly require washout and suturing.

Sprains

Indirect stress injuries to joint capsules or ligaments. Requires bracing to allow proper healing. Severe cases require prolonged bracing and possibly surgery.

Strains

Occurs in muscles and the myotendinous junction. Treatment is similar to that for sprains.

Classic initial management of soft tissue injury is RICE or rest, icing, compression and elevation. This is most effective if applied in the early stages after an injury. Rehabilitation is key in allowing early return to function and sports.

OVERUSE INJURIES

Rotator cuff tendonitis

Occurs with repetitive overhead activities or direct trauma to the shoulder such as contusion, dislocation or overload lifting. Symptoms include generalised shoulder pain, or pain which worsens with overhead activities or which affects sleep.

Thrower's shoulder and thrower's elbow

Overuse injuries resulting from excessive throwing. Treatment for most injuries consists of rest, activity modification and a rehabilitation program.



Osgood Schlatter disease

Irritation and inflammation of the growth plate at the top of the shin bone where the patella tendon inserts. This condition occurs during periods of rapid growth. It is treated by stretching and strengthening exercises of the hamstrings and quadriceps, and through activity modification.

Sinding-Larsen-Johansson syndrome.

Also known as Jumpers Knee, it is the inflammation and irritation of the

growth plate at bottom of the patella, where the patella tendon inserts. This condition usually happens during periods of rapid growth. Treatment is similar to that for Osgood Schlatter disease.

Sever's disease

It is the irritation and inflammation of the growth plate at the back of the heel bone where the Achilles tendon inserts. Treatment consists of rest, ankle stretching and strengthening exercises and heel pads.

Osteochondritis dissecans

This is a condition where the bone and adjacent cartilage loses its blood supply. It may affect the knee, ankle or elbow. Often visible on x-rays, but usually require MRI to delineate fully. Can be treated with bracing or casting initially, but larger lesions often require surgery, especially in older children.

Stress fractures

Occurs following repetitive trauma to normal bone that is not conditioned to the stress. Commonly in the lower limbs and usually responds well to rest and gradual resumption of activity.

ACUTE INJURIES

Shoulder dislocation

Usually occurs when the top of the humerus is sitting in front of the shoulder blade moves out of position as a result of a fall or trauma. There will be generalised swelling, loss of the normal shoulder

contour as well as restricted arm movement. As a result of the dislocation, injuries to the capsule, labrum, glenoid bone and bone of the humeral head may occur. Injury to the axillary nerve may also occur.

Treatment consists of putting the humerus back in place early (early reduction) and initial immobilization, followed by range of motion and shoulder-strengthening exercises.

There is a high recurrence rate of more than 90% in young individuals after the first episode of dislocation. Hence surgery to stabilise the shoulder joint is often advised to ensure early return to sports and strenuous upper limb activities.

Patella (knee cap) dislocation

This occurs when the knee cap comes out of its normal position. A dislocated patella may reduce spontaneously i.e. goes back into its proper place on its own.

Patella dislocation can be due to a fall or trauma. It can also be due to the presence of subtle abnormalities in the knee anatomy that predispose the child to having repeated patella dislocations.

Initial treatment include early reduction, immobilisation for a few weeks, then range of motion and strengthening exercises.

Osteochondral fracture (broken cartilage covering end of bone), patella maltracking (where the patella does not stay within the central groove of the thigh bone) or recurrent dislocations are indications for surgical repair and reconstruction.

Anterior cruciate ligament (ACL) injuries

This usually occurs as a result of a twisting injury to the knee during sports activities. It is associated with a 'pop' sensation during injury, knee swelling, difficulty bearing weight and inability to continue with the sports activities. It can be associated with meniscus, cartilage and other ligament injuries.

Midsubstance ACL (purely ligamentous) injuries are more common in adolescents, while bony ACL avulsion (injury at the ligament-bone attachment) are more common in younger children.

MRI helps to confirm diagnosis and also exclude other concomitant injuries described earlier.

Non-operative treatment includes bracing the knee, restoration of range of motion, strengthening the quadriceps and hamstrings, and activity restriction.

Most children are unable to restrict activity and hence require operative management of the ACL. The ACL injury can be physically treated via the 'physeal sparing' technique, which avoids the growth plates in the bones of the growing child. This will ensure that the subsequent growth and

development of the limb remain unaffected.

Meniscal injuries

This can occur on its own, but is frequently associated with ACL injuries, tibial eminence fractures and cartilage injuries. A small percentage of children (less than 1%) may have abnormally-shaped meniscus (discoid meniscus). This condition increases the risk of a meniscus injury.

Meniscus injuries present with pain, swelling, stiffness, clicking, locking or popping of the knee joint. MRI is helpful for assessment. Most meniscus injuries require surgical repair or trimming to prevent secondary damage to the cartilage and eliminate the symptoms of pain, popping or locking.

Ankle Instability

This occurs due to an inversion injury to the ankle (ankle sprain). A severe ankle sprain or repeated injuries can cause the ankle ligaments to become overstretched or tear over time. This can then cause secondary cartilage injury of the ankle and become a source of pain during physical activities or prolonged walking.

Ankle sprains are managed initially with physiotherapy, bracing, rest and elevation. However, if there is no improvement in the symptoms of instability and pain, surgical reconstruction of the ankle ligaments may be necessary.

Hip Labral Tears

This can be a source of hip or groin pain in athletes, dancers and gymnasts. The repeated extreme range of movements of the hip in this group of patients can cause tears in the lining of the hip joint (labral tears) as the hypermobile femur neck (top part of the thigh bone) repeatedly abuts the labrum.

Initial management includes rest, activity modification and physiotherapy. Arthroscopic (keyhole) surgical repair may be necessary if conservative measures fail to relieve the symptoms.

The surgical treatment for the abovementioned acute sports injuries can mostly be done via arthroscopic (keyhole) or minimally invasive (small incisions) methods. This is to ensure less postoperative discomfort, faster recovery and reduced hospital stay for our paediatric and adolescent patients.



We have a dedicated team of sports surgeons, physicians, therapists and nutritionists at the Singapore Sport and Exercise Medicine Center @ KKH which allows us to treat sports injuries in children and adolescents in a coordinated and comprehensive fashion. This minimises adverse effects and maximises our patients' rehabilitation and recovery.

Singapore General Hospital



Department of Orthopaedic Surgery

At Singapore General Hospital, the Department of Orthopaedic Surgery - the oldest and most established in the country - offers a fully comprehensive service in the consultation and treatment of disorders of the musculoskeletal system.

As a nationally recognised centre of excellence, SGH Orthopaedic Services comprises a large team of highly-trained specialists, orthopaedic surgeons, nurse clinicians, physical and occupational therapists, all of whom are equipped to provide patients with the most appropriate diagnosis, assessment, rehabilitation and treatment plan.

Outstanding in their individual fields, our highly-trained specialists offer extensive expertise in such areas as joint replacement, ankle and foot treatment, musculoskeletal tumours, spinal care treatment, trauma and sports-related injuries.

Senior Consultants

- Prof Andrew Tan Hwee Chye (Head)
- Assoc Prof Tan Mann Hong (Division Chair; Director, Musculoskeletal Tumour Service)
- Prof Tay Boon Keng (Emeritus Consultant)
- Prof Tan Ser Kiat (Emeritus Consultant)
- Assoc Prof Darren Tay Keng Jin (Deputy Head, Clinical; Co-Director, Acute Care Service)
- Assoc Prof Goh Seo Kiat (Deputy Head, Education; Director, Trauma Service)
- Assoc Prof Koh Suang Bee, Joyce (Deputy Head, Research)
- Dr Mitra Amit Kanta
- Assoc Prof Chang Chee Cheng, Paul
- Dr John Chen Li Tat (Director, Spine Service)

- Assoc Prof Guo Chang Ming
- Dr Henry Soeharno
- Prof Howe Tet Sen
- Assoc Prof Inderjeet Singh Rikhraj
- Dr Lee Kong Hwee (Director, Sports Service)
- Assoc Prof Denny Lie Tijauw Tjoen
- Dr Ling Zhixing Marcus
- Assoc Prof Pang Hee Nee (Director, Adult Reconstruction Service)
- Assoc Prof Soh Chee Cheong Reuben
- Prof Yeo Seng Jin

Consultants

- Dr Ang Chay You
- Dr Ang Fu Hong Benjamin
- Dr Bryon Teo Jun Xiang
- Assoc Prof Chen Yongqiang Jerry Delphi
- Dr Chia Zi Yang
- Dr Chua Ser Kenon
- Dr Huang Miao'en Deborah
- Dr Jiang Lei
- Dr Li Zongxian
- Dr Lim Beng Teck Jason (WHC)
- Dr Lim Yee Gen
- Assoc Prof Liow Ming Han Lincoln
- Dr Liu Xuan Eric
- Dr Ng Yeong Huei
- Dr Ou Yang Youheng
- Dr Suraya Zainul Abidin
- Dr Tan Shi Ming
- Dr Tay Kae Sian (Director, Foot & Ankle Service)
- Dr Tay Xian Khing Kenny
- Dr Woo Yew Lok
- Dr Xia Zhan

Associate Consultants

- Dr Audrey Han Xinyun
- Dr Christian Heng Hwee Yee
- Dr Kizher Shajahan Mohamed
- Dr Soong Junwei
- Dr Toh Rui Xiang

Department of Hand & Reconstructive Microsurgery

The Department of Hand & Reconstructive Microsurgery provides comprehensive management of all traumas and diseases affecting the hand and the wrist; upper limb diseases that affect hand function and microsurgical reconstruction.

It is a recognised tertiary referral centre for complex conditions affecting the hand and upper limb. There are 24-hour emergency hand services, specialist outpatient services and ambulatory surgery services.

The range of services include:

- Common Hand Conditions
- Hand Trauma
- Congenital Hand Abnormalities
- Wrist Trauma and Disorders
- Endoscopic Surgery
- Upper Limb Paralysis
- Microsurgical Reconstruction of the Upper Limb
- Hand Therapy

Senior Consultants

- Dr Robert Yap Tze-Jin (Head)
- Assoc Prof Agnes Tan Beng Hoi (Emeritus Consultant)
- Assoc Prof Andrew Chin Yuan Hui
- Dr Chong Chew Wei
- Dr Darryl Chew Ee Ming
- Dr Lam Wee Leon
- Prof Duncan Angus McGrouther

Consultants

- Dr Chung Sze-Ryn
- Dr Kang Yong Chiang
- Dr Lai Jen Ming
- Asst Prof Rebecca Lim
- Dr Joyce Tie Lin

Associate Consultant

- Dr Wang Qiao

Department of Endocrinology

The Department of Endocrinology provides tertiary level care in hormonal and metabolic disorders.

Patients with diabetes mellitus and diabetes-related disorders are seen at the Diabetes Centre which provides a comprehensive range of services under one roof, including:

- Retinal photography
- On-site blood and urinary testing
- Podiatry service

- Diabetes education
- Nutritional counselling
- Vascular and neurological assessment
- Treatment of diabetes in pregnancy
- Continuous subcutaneous insulin infusio 'infusion pump' and continuous glucose monitoring services
- Specialised clinics for Type 1 Diabetes, young Type 2 Diabetes
- Regular self-management courses for patients and families

The endocrine arm provides services in:

- Thyroid disorders
- Lipid/Cholesterol disorders
- Hypothalamus, pituitary and adrenal disorders
- Osteoporosis and Disorders of Bone Metabolism:
 - Exercise Physiotherapy for Bone Strengthening
 - Osteoporosis Nurse Counselling
 - Nutritional Counselling for Osteoporosis (Diet Bone Clinic)
- General Endocrinology

Senior Consultants

- Assoc Prof Bee Yong Mong (Head)
- Prof Manju Chandran
- Dr Suresh Rama Chandran
- Dr Chng Chiaw Ling
- Dr Daphne Gardner Tan Su-Lyn
- Assoc Prof Goh Su-Yen
- Dr Emily Ho Tse Lin
- Dr Kek Peng Chin
- Dr Lee Phong Ching
- Dr Lim Weiyong
- Dr Lim Heok Seng
- Dr Dawn Lim Shao Ting
- Dr Adoree Lim Yi Ying
- Dr Loh Lih Ming
- Dr Swee Du Soon
- Dr Tan Hong Chang
- Dr Teh Ming Ming

Consultants

- Dr David Carmody
- Dr Ann Kwee
- Dr Amanda Lam Yun Rui
- Dr Zhu Ling

Associate Consultants

- Dr Kovalik Jean-Paul
- Dr Sarah Tan Ying Tse
- Dr Kristy Tian Jia Yi

Department of Rheumatology & Immunology

The Department of Rheumatology & Immunology provides inpatient and outpatient clinical services for the diagnosis and management of all rheumatology-related conditions.

The Autoimmunity and Rheumatology Centre (ARC), anchored by the Department, provides evidence-based medical care through a comprehensive range of clinical services in a one-stop multidisciplinary centre:

- General Rheumatology clinics
- Specialised clinics that include Systemic lupus erythematosus, Systemic Sclerosis, Spondyloarthritis, Psoriatic arthritis and Rheumatoid arthritis
- Musculoskeletal ultrasound for early diagnosis and monitoring of arthritis
- Nailfold capillaroscopy for early diagnosis of Systemic Sclerosis spectrum of diseases
- Advanced Practice Nurse- and Pharmacist-led on-site Rheumatology Monitoring Clinic and Virtual Monitoring Clinic which provide follow-up of stable patients

- Focused physiotherapy, occupational therapy and podiatry services
- Patient education and counselling

Combined clinics with other Centres/ departments on the SGH Campus provide dedicated care for complex Rheumatological conditions:

- Pregnancy and rheumatological diseases (combined with Department of Obstetrics and Gynaecology, SGH)
- Eye and rheumatological diseases (combined with Singapore National Eye Centre)
- Pulmonary hypertension in connective tissue diseases (combined with National Heart Centre Singapore and Department of Respiratory Medicine, SGH)

Senior Consultants

- Assoc Prof Ng Chin Teck (Head)
- Assoc Prof Andrea Low Hsiu Ling
- Dr Cassandra Hong Fong Yi
- Dr Chew Li-Ching
- Prof Fong Kok Yong
- Prof Julian Thumboo
- Assoc Prof Jon Yoong Kah Choun
- Assoc Prof Katy Leung Ying Ying
- Dr Poh Yih Jia
- Dr Tan York Kiat
- Assoc Prof Warren Fong Weng Seng
- Dr Yeo Siaw Ing

Consultants

- Dr Sue-Ann Ng Pei Lun
- Dr Tan Tze Chin

Associate Consultants

- Dr Charmaine Wang Tze May
- Dr Maria Noviani

KK Women's and Children's Hospital



Department of Orthopaedic Surgery

The department is staffed by full-time, fellowship-trained paediatric orthopaedic surgeons as well as visiting orthopaedic consultants with different subspecialty interests. The surgeons are committed to provide the highest quality specialist care for children.

Our senior staff have teaching appointments with the Yong Loo Lin School of Medicine, National University of Singapore, the DUKE-NUS Medical School and the Lee Kong Chian School of Medicine, Nanyang Technological University.

The range of services include:

- Fractures and musculoskeletal trauma
- Scoliosis (curved spine), back pain, torticollis and other paediatric spine conditions
- Foot problems such as flatfoot and bunions
- Congenital clubfoot (congenital talipes equinovarus) and its treatment by the Ponseti method
- Sports injuries, including arthroscopic (keyhole) and minimally invasive surgical procedures for the shoulder, elbow, hip, knee and ankle
- Hip conditions such as developmental dysplasia of the hip, Perthes disease, and slipped capital femoral epiphysis
- The orthopaedic manifestations of neuromuscular conditions like cerebral palsy, spina bifida, and the muscular dystrophies
- Limb length discrepancy and angular deformities of the limbs
- Hand problems such as trigger finger, polydactyl (extra thumb or finger) or syndactyly (fused fingers)

- Musculoskeletal infections and tumours
- Surveillance of physiological conditions such as knock-knees, bow-legs, and in-toeing (pigeon-toed gait)

Senior Consultants

- Dr Mohammad Ashik Bin Zainuddin (Head)
- Assoc Prof Arjandas Mahadev
- Assoc Prof Kevin Lim Boon Leong

Consultants

- Asst Prof Kenneth Wong Pak Leung

Associate Consultants

- Dr Stacy Ng Wei Ling
- Dr Derrick Lam Jun Liang
- Dr Woo Chin Yee
- Dr Andrew Chou Chia Chen

Changi General Hospital



Department of Orthopaedic Surgery

The Department of Orthopaedic Surgery treats a diverse spectrum of orthopaedic and musculoskeletal conditions involving disorders of bones, joints and musculoskeletal systems. We are committed to delivering optimal patient care and outcomes.

We have been actively developing our holistic care capabilities to provide an optimum quality of personalised care in assisting patients suffering from various orthopaedic conditions; to return them to their pre-morbid activities when possible.

The range of services include:

- Foot and Ankle Surgery
 - Complex foot and ankle fracture fixation
 - Minimally invasive fracture fixation
 - Ankle arthroscopy
 - Foot and ankle deformity correction
 - Foot and ankle sports injuries
- Hip and Knee Surgery
 - Unicompartmental/total knee replacement
 - Computer-navigated total knee replacement
 - Complex primary knee and hip replacement
 - Revision primary knee and hip replacement
 - Prosthetic joint infection
 - Complex periprosthetic fractures
- Integrated Spine Surgery
 - Computer navigation
 - Minimally invasive spine surgery
 - Spine trauma
 - Degenerative spine
 - Spine tumours and endoscopic Surgery
- Shoulder and Elbow Surgery
 - Complex shoulder & elbow fracture fixation
 - Arthroscopic surgery
 - Shoulder and elbow replacement

- Sports Surgery
- Arthroscopic surgery for knee, Shoulder , ankle and hip
- Ligament Reconstruction, Meniscus and Cartilage surgery
- Joint preservation surgery
 - Trauma and Limb Salvage Surgery
- Management of long bones & joints fractures
- Pelvic and Acetabular fractures
- Management of fractures malunion & non-union

Senior Consultants

- Dr Yeo Kuei Siong Andy (Head)
- Assoc Prof Low Boon Yong (Emeritus Consultant)
- Dr Chua Thai Chong David
- Dr Loh Sir Young James
- Dr Shree Kumar Dinesh
- Dr See Hung Foo
- Dr Kinjal Vidyut Mehta
- Dr Kuo Chung Liang

Consultants

- Dr Kon Kam King Charles
- Dr Teo Hong Lee Terry
- Dr Raghuraman Raghavan
- Dr Lee Yunyu Justine
- Dr Boo Ho Chin
- Dr Chew Zhihong

Associate Consultants

- Dr Foong Wei Sheng
- Dr Moo Ing How
- Dr Siti Mastura Binte Rahim
- Dr Jonathan Gan Zhi Zhi Wei

Visiting Consultants

- Dr William Verhoeven
- Dr David Tan Meng Kiat
- Dr Sandeep Jacop Sebastin
- Dr Mark Edward Puhaindran

Seng Kang General Hospital



Department of Orthopaedic Surgery

The Department of Orthopaedic Surgery at Sengkang General Hospital offers a full spectrum of services across Orthopaedic & Hand Surgery as well as Sports Medicine. We offer a range of both conservative and surgical solutions to alleviate your pain and restore your function, including minimally invasive and state-of-the-art novel therapeutic options.

Our team of surgeons and physicians provide excellent care for both acute as well as chronic degenerative conditions. Our department places a strong emphasis on holistic care from diagnosis to treatment including surgery and rehabilitation.

The range of services include:

- Low Back Pain
- Knee Injuries including Cartilage Injuries and Osteoarthritis of the Knee
- Shoulder & Elbow Injuries such as Frozen-Shoulder, Rotator-Cuff, Tennis Elbow Lateral
- Spine and Spinal Disorders

Senior Consultants

- Dr Poon Kein Boon (Head)
- Dr Kwek Beng Kee Ernest
- A/Prof Wong Merng Koon
- Dr Chia Sinn Yii Dawn
- A/Prof Inderjeet Singh Rikhranj
- Dr Siow Wei Ming

Consultants

- Dr Lim Wei-An Joel
- Dr Wang Tzong-Yee Colin
- Dr Chen Haobin
- A/Prof Hamid Rahmatullah Bin Abd Razak
- Dr Huang Yilun
- Dr Muntasir Mannan Choudhury

- Dr Wong Keng Lin Francis
- Dr Png Wenxian

Associate Consultants

- Dr Derrick Guo Junhong
- Dr Ian Dominic Dhanaraj
- Dr Chau Hong Him Dickson
- Dr Neo Ghim Hoe
- Dr Cheow Xunqi
- Dr Cher Wei Liang Eric

National Neuroscience Institute



Department of Neurosurgery

The department comprises a team of highly-trained specialists offering extensive expertise in the areas of neuro-oncology, head injuries, functional neurosurgery, paediatric neurosurgery, spine surgery, etc.

Spine Surgery at NNI

A common degenerative disorder of the spine seen under our Spine Programme is cervical and lumbar spondylosis, whereby the discs, bony protrusions and hypertrophied ligaments press on the spinal nerves and spinal cord to cause pain, numbness, weakness and at times, difficulty in walking and passing urine.

The majority of such patients are treated with medications and physical therapy but

those with spinal cord compression and neurological deficits usually will require surgery.

Less common are spinal tumours, which are usually removed so they do not cause further paralysis.

Senior Consultants

- Assoc Prof Low Chyi Yeu David (Deputy CEO)
- Dr Ng Yew Poh Vincent (Head)
- Dr Rao Jai Prashanth (Head)
- Dr Ling Ji Min (Head of Service)
- Dr Sharon Low (Head of Service)
- Dr Thomas Tan Choo Heng (Head of Service)
- Dr Chumpon Chantharakulpongsa (Emeritus Consultant)
- Assoc Prof Ong Peck Leong (Emeritus Consultant)
- Assoc Prof Ang Beng Ti Christopher
- Dr Hwang Ying Khai Peter
- Dr Keong Nicole Chwee Har
- Assoc Prof Kirolos Ramez Wadie
- Dr Krishan Kumar Sharma
- Prof Ng Wai Hoe
- Dr Pillay Robin
- Assoc Prof Seow Wan Tew

Consultants

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- Dr Chen Min Wei
- Dr Julian Han
- Dr Ker Rui Xin Justin
- Dr Lee Chee Hoe Lester
- Dr Wan Kai Rui

Associate Consultants

- Dr Lim Jia Xu
- Dr Mak Siu Kei David
- Dr Cheong Tien Meng

SingHealth Duke-NUS Spine Centre

The SingHealth Duke-NUS Spine Centre will bring together multi-disciplinary expertise – from orthopaedic surgery and neurosurgery to rehabilitation medicine and pain medicine and coordinate the existing services provided by CGH, KKH, NNI, SGH and SKH – to provide the best care and outcomes for our patients with spine conditions.

The range of services include:

- Spinal Stenosis
- Cervical Spondylosis, Cervical Myelopathy, Radiculopathy.
- Paediatric, Adolescent, Adult Scoliosis, and other deformities of the spine
- Slipped 'Herniated' Discs
- Degenerative Disc Disease
- Fractures of the spine
- Osteoporosis
- Spine Infections
- Spondylolysis
- Spondylolisthesis
- Primary Spinal cord tumours
- Spinal Tumours and Palliative care
- Epidural Steroid Injections, Radiofrequency Ablation
- Failed Back syndrome
- Neuropathic pain

- Spinal cord injury
- Return to baseline (Rehabilitative medicine)
- Vertebroplasty and cement Augmentation (Interventional Radiology)

Senior Consultants

- Dr Dinesh Shree Kumar (Head)
- Assoc Prof Soh Chee Cheong Reuben (Deputy Head, Spine Centre & Service Chief @SGH)
- Dr Ling Zhixing Marcus (Director, Clinical Services)
- Dr Prasanna Kappaganthu Venkatesh (Director, Rehabilitation Services)
- Assoc Prof Chan Xin Hui Diana (Director, Pain Services)
- Assoc Prof Kevin Lim Boon Leong (Service Chief @KKH)

Consultants

- Dr Ou Yang Youheng (Director, Education)
- Dr Ling Ji Min (Service Chief @NNI, TTSH Campus)
- Dr Terry Teo Hong Lee (Service Chief @CGH)
- Dr Huang Yilun (Service Chief @SKH)
- Dr Jiang Lei (Director, Research)

Patient Liaison Service Department



SGH Patient Liaison Service Department (PLS) is SGH's point of contact in managing referrals from GPs, insurance companies and overseas patients. The department aims to provide holistic supports to clinical departments, care partners, patients, and external organizations to increase public awareness of SGH services and enhance patient's care delivery.

At PLS, we work closely with clinicians for timely access to medical appointments and assist with administrative facilitation for seamless patient's journey, including facilitating the pre-authorization submission for insurance policy holders.

With Division of Musculoskeletal Services, we have been collaborating in regular outreach activities to various stakeholders – GP, Insurance Partners and general member of public.

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Acknowledgements

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Singapore General Hospital

**Department of Hand &
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Singapore General Hospital

Department of Endocrinology
Singapore General Hospital

**Department of Rheumatology &
Immunology**
Singapore General Hospital

Department of Orthopaedic Surgery
KK Women's and Children's Hospital

Department of Orthopaedic Surgery
Changi General Hospital

Department of Orthopaedic Surgery
Seng Kang General Hospital

Department of Neurosurgery
National Neuroscience Institute

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www.sgh.com.sg



KK Women's and
Children's Hospital

Tel: (65) 6294 4050
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National Specialty Centres



National Cancer
Centre Singapore

Tel: (65) 6436 8088
www.nccs.com.sg



National Heart
Centre Singapore

Tel: (65) 6436 7840
www.nhcs.com.sg



Singapore National
Eye Centre

Tel: (65) 6227 7266
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National Dental
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Tel: (65) 6324 8802
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National
Neuroscience Institute

Tel: (65) 6357 7095
www.nni.com.sg

Primary Healthcare



Polyclinics
SingHealth

Tel: (65) 6236 4800
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Community Hospital



Together We Care 明明醫院
Bright Vision
Hospital

Partner in Academic Medicine



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