NUHS
National University Health System

National University Spine Institute

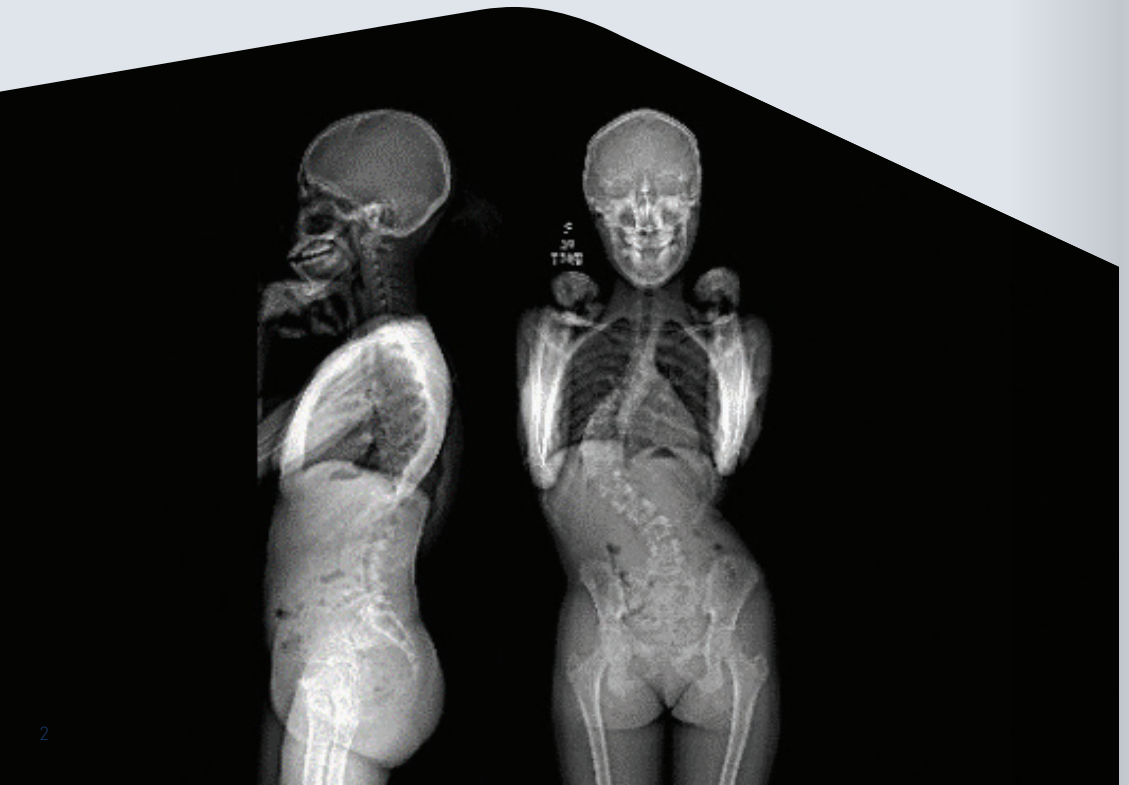
Spinal Deformities

Please scan QR code for more information on NUSI

National University Spine Institute (NUSI) is a spine specialist centre that provides dedicated, holistic and multi-disciplinary care for patients with spinal diseases. The team comprises of members from Orthopaedic Surgery, Neurosurgery and Rehabilitation Medicine across National University Hospital (NUH), Ng Teng Fong General Hospital (NTFGH) and Alexandra Hospital (AH).

Spinal Deformity

Spinal deformity refers to a spectrum of medical conditions affecting the straight alignment of the normal human spine. These deformities can occur as a result of birth defect, a child's growth, aging, injury, or previous spine surgery.



Types of Spinal Deformities

Scoliosis is a condition in which the spine curves laterally (side-to-side), forming an "S" or "C" shape when viewed from the back. This condition may cause the patient's upper body to shift to one side and is the most common form of spinal deformity.

Scoliosis

Kyphotic deformity is a condition in which the spine forms an excessive outward curve (back-to-front), resulting in an abnormal rounding of the upper back. This condition may cause a person's upper body to stoop forward (a 'hunchback').

Kyphotic deformity

Kypho-scoliosis is a condition involving both kyphotic and scoliotic spinal deformities.

Spinal deformities can occur in any regions of the spine: neck (cervical spine), chest (thoracic spine) and abdomen regions (lumbar/sacral spine). The deformities can occur in both children and adult populations and have different clinical symptoms. The most common form of spinal deformity in children is **adolescent idiopathic scoliosis** which is usually presented after the age of 10 and usually does not have any clinical symptoms. The deformity is usually detected through the School Health Screening Services from the Health Promotion Board.

Adult degenerative scoliosis or kypho-scoliosis typically occurs after 40 years of age. In addition to the spinal deformity, the patient may complain of back pains due to the arthritic degeneration of the spine. The pains may radiate down from the spine to the legs, indicating spinal nerve compression.

Common Causes of Scoliosis in Children

- **Idiopathic Scoliosis** does not have any known causes. Although many causes have been implicated (growth hormone, melatonin, heavy schoolbag, sports, physical activities, poor standing/sitting postures), none of these were conclusive. Recent research shows genetic factors may be the cause of scoliosis. There is no conclusive evidence to show chiropratic or traditional medicine could halt the scoliosis progresion.

  The prevalence of adolescent idiopathic scoliosis progression. The prevalence of adolescent idiopathic scoliosis in Singaporean schoolgirls is 1.4% for 11-12 years of age and 2.2% for 13-14 years of age. Scoliosis is more common in girls than in boys (ratio of 7:1) and it affects all races.

- **Congenital Scoliosis** is a result of congenital birth defects in the spine and is often associated with other organ defects.

- **Neuromuscular Scoliosis** is a result of abnormal control of the nerves and muscles that support the spine. Common causes of this type of scoliosis are conditions such as cerebral palsy or muscular dystrophy.

Common Causes of Adult Degenerative Scoliosis

Adult Degenerative Scoliosis could be due to the degenerative progression of pre-existing, unrecognised idiopathic scoliosis.

Scoliosis may also occur in patients with no pre-existing spinal deformity. This is due to an age-related, uneven degeneration of the intervertebral discs and facet joints, resulting in an asymmetric alignment of the spine.

The deformity is often made worse with occurrence of osteoporotic spinal fracture.

Physical Signs of Scoliosis

Patients who have scoliosis may exhibit some of the following signs:

- Uneven shoulder height
- Tilting of the body to one side when viewed from the patient's back
- "S" or "C" shaped curve in the back
- A tilt in the waistline
- Clothes do not fit properly
- Appearance of the rib hump when patient bends forward

Fig 1: A rib hump seen from the back

Aims of Scoliosis Treatment

The primary aim for spinal deformity treatment is to control the progession of scoliosis and maintain a balanced spinal alignment. Uncontrolled scoliosis progession may result in severe deformity and restrictions to lungs and heart functions.

Scoliosis Treatment Strategies

The general treatment principles are outlined in the following table:

Cobb angle (Magnitude of curve)	State of skeletal maturity	Recommended treatment
Less than 20°	Immature	Observation
Between 20° to 45°	Immature	Bracing
Greater than 45°	Immature	Surgery
Greater than 50°	Mature	Surgery

- **Observation** in which a regular X-ray examination is required every 6-12 months. Currently, there is no evidence to suggest that chiropractic treatment, swimming, physiotheraphy or any dietary supplement can correct scoliotic deformity.

- **Bracing** is prescribed to stop the progession of mild scoliotic deformity in a skeletaly immature spine. Bracing for more than 18 hours per day is recommended. The treatment is terminated when either the spine has reached full skeletal maturity e.g. >16 years of age for girls; >17 years of age for boys or the brace is unable to halt the progression of the curve.

- **Surgery** aims to fuse (join together) the vertebrae in a balanced spinal alignment and stop deformity progression. This is usually performed via a long skin incision along the back of the spine with the application of spinal implants to hold the spine in position (Fig 2). In suitable patients, the surgery can be performed through thoracoscopic or minimally-invasive keyhole surgery that requires only 4 to 5 small incisions through the side of the chest wall (Fig 3). For adult degenerative scoliosis, decompression of the compromised nerve will also be prescribed as part of the surgical treatment.

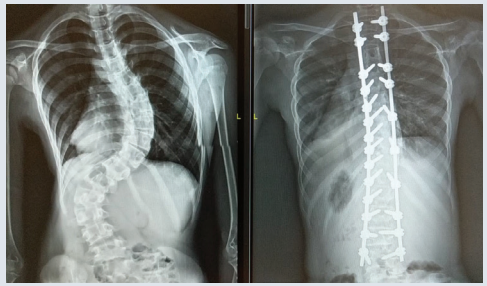


Fig 2: Posterier spinal approach

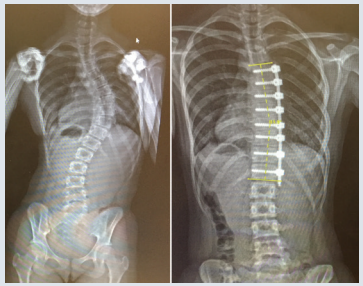


Fig 3: Minimally invasive keyhole surgery in anterior spinal approach

What happens after surgery

Most patients can return to school or work 3 to 4 weeks after surgery. In the first 6 months after surgery, jumping, twisting, running and heavy lifting (more than 5kg) should be avoided. Patients may be exempted from Physical Education for up to a year. As each individual's recovery is different, doctor's advice should be sought before any participation in physical activities and sports. If a brace is prescribed, it should be worn whenever one is in an upright position. Air travel should not pose any issues as the metallic spinal implants are located deep in the body and should not set off any metal detectors during international flight travel.

Specialised Care

As the field of spinal deformity research is rapidly evolving and the complexity of the surgical treatment is often demanding, highly specialised patient care is needed to ensure an optimal clinical outcome.

At the National University Health System, we have a team of spine surgeons trained in spinal deformity treatment. Together with paediatricians, specialised nurse-clinicians and physiotherapists, as well as a well-equipped post-operative patient monitoring facility, we offer a plethora of specialised and comprehensive services for the treatment and management of spinal deformities and diseases.

Our Patient Care Institutions

National University Hospital
Ng Teng Fong General Hospital &
Jurong Community Hospital
Alexandra Hospital
National University Polyclinics
Jurong Medical Centre
National University Cancer Institute, Singapore
National University Heart Centre, Singapore
National University Centre for Oral Health, Singapore
NUHS Diagnostics
NUHS Pharmacy

Scan the QR code for more information on our patient care institutions.

OneNUHS Hotline: (65) 6908 2222
OneNUHS General Enquiries: contactus@nuhs.edu.sg
OneNUHS Appointments: appointment@nuhs.edu.sg
www.nuhs.edu.sg

Take charge of your health and access health information and services across NUHS institutions.
Download the NUHS App now!

Scan to download