SOUVENIR PROGRAMME & ABSTRACT BOOK

2ND APSS KATHMANDU OPERATIVE SPINE COURSE

16TH – 18TH MARCH 2017

KATHMANDU MEDICAL COLLEGE TEACHING HOSPITAL
SINAMANGAL, KATHMANDU
NEPAL

CENTRAL SPONSOR

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CONTENTS

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MESSAGE FROM THE PRESIDENT OF THE ASIA PACIFIC SPINE SOCIETY

Dear Colleagues and Friends,

It gives me the greatest pleasure to welcome you to join us at the 2nd Kathmandu Operative Spine Course of the Asia Pacific Spine Society (APSS) which is held at Kathmandu Medical College Teaching Hospital, Sinamangal, Kathmandu, Nepal from March 16 – 18, 2017. Following the previous successful operative course held in the same institute in 2014, the APSS is very excited to be back again in Kathmandu. Since 1980, the APSS has been holding various basic and advanced operative spine courses in the Asia Pacific region including Bangladesh, Cambodia, China, India, Indonesia, Japan, Korea, Malaysia, Myanmar, Philippines, Sri Lanka, Taiwan, Thailand and Vietnam.

The course will provide a constructive and conducive platform for you to enhance the principal and advanced knowledge of pathological conditions of spinal disorders and explore the latest surgical techniques of spinal surgery. With the presence of international and local faculty members, plenty of networking opportunities will be available for you to personally interact with them during the pre-operative discussion, lectures and saw bone workshops during the course. The highlight of the course is the showcase of live surgeries conducted by both our faculty members and local team, in which the surgeries will be transmitted live to the auditorium to facilitate the learning of the surgical techniques. You may look forward to the interesting discussion with the surgeons during and after their operations regarding various surgical techniques including tips and tricks to improve the positive results and to avoid complications during the surgeries.

Alongside the educational program, I encourage you to take time to immerse in Kathmandu's timeless cultural and artistic heritage, marvel at the medieval temples, and trek along the Himalayan range.

On behalf of the APSS, I would like to express my deepest appreciation to the society's official partner, Medtronic, for their unwavering support to our educational activities. I wish to congratulate the local organizing chairman, Dr Rohit Pokharel, and vice chairman, Dr Rabindra Pradhan, as well as ASSN Committee for such a successful partnership in organizing this course.

I welcome you to a memorable experience in Kathmandu.

With warmest regards,

Kuniyoshi Abumi, MD

President of the Asia Pacific Spine Society

MESSAGE FROM THE MEDICAL DIRECTOR OF THE KATHMANDU MEDICAL COLLEGE TEACHING HOSPITAL

It is indeed a great pleasure to extend a warm welcome to all the speakers and participants for the 2nd APSS operative course that is being held at Kathmandu Medical College Teaching Hospital. We are glad that this course is being conducted for the second time in our institute.

The positive feedback we have received from the participants from the first course is testimony that this course is very popular and has stimulated interest in spine surgery all over Nepal. Prof Abumi, the President of APSS, has been instrumental in developing and transferring knowledge to the spine surgeons of our institution and also across Nepal.

We have tried our level best to fully accommodate the facilities present in our hospital so as to smooth functioning of the course. Spine surgery is a rapidly growing field and one has to be constantly updated to keep up with the advancement and this type of course will act as bridge for the spine surgeons in our country.

Finally, we would like to wish all the participants to have a memorable experience and an opportunity to learn and interact with the renowned faculty from the Asia Pacific region.

Best wishes,

Kiran P Rijal, PhD

Medical Director of the Kathmandu Medical College Teaching Hospital, Kathmandu, Nepal

MESSAGE FROM THE LOCAL ORGANIZING CHAIRMAN

It is my great honor to welcome you all in the 2nd APSS Kathmandu Course held at Kathmandu Medical College Teaching Hospital, Nepal. The grand success of the first course, and demand from young Nepalese spine surgeons encouraged us to have similar one again. Faculties who have visited Kathmandu, and have seen the old buildings and world heritage sites during the first course in 2014 might feel sad not able to see them anymore. Nepal is now at the phase of reconstruction after the devastating earthquake that hit her on 25th April 2015. Acceptance of our invitation by eminent faculties from the region is a matter of honor for us.

The course will have three academic parts; presentation and lecture on spine topics, saw bone demonstration and live surgeries. I hope the participants will have very active participation in every academic session and it will be a fruitful course for us.

This year, we are organizing the course in post disaster stage and is earlier than it was scheduled. However, active coordination from the APSS Secretariat and hard work of ASSN members will make the event a successful one. On behalf of 2nd APSS Kathmandu Operative Course Organizing Committee, I would again like to welcome you all in this historic temple city of Kathmandu. March is one of the good season to visit Nepal. I hope your stay in Nepal will be pleasant and rewarding.

Rohit Pokharel, MD, PhD

Local Organizing Chairman
2nd APSS Kathmandu Operative Course

FACULTY – INTERNATIONAL & LOCAL

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Sinamangal, Kathmandu
NEPAL

PROPOSED CASES FOR THIS OPERATIVE SPINE COURSE

1. Cervical Spine
   a. Anterior Cervical i.e. ACDF or ACCF
   b. Anterior Cervical i.e. Arthroplasty
   c. Posterior Cervical Fixation i.e. Lateral Mass or Pedicle Screw Fusion
   d. Posterior Cervical Decompression i.e. Laminoplasty
   e. Posterior Cervical C1/2 Fusion
   f. Posterior Occipitocervical Fusion

2. Coronal Deformity Correction
   a. Adolescent Idiopathic Scoliosis i.e. Posterior Instrumented Spinal Fusion

3. Sagittal Deformity Correction
   A. Ankylosing Spondylitis
   B. Scheuermann Kyphosis
   C. Neglected Traumatic Fracture
   d. TB Spine Kyphosis

4. Spinal Instability +/- Neurological Deficit for Stabilization +/- Decompression
   A. Traumatic Acute Fracture
   B. Spinal Infection
   C. Spinal Metastases

5. Lumbar Spinal Stenosis (LSS)
   a. Decompression Alone i.e Medial Facetectomy, Laminectomy or Internal Laminolasty, Discectomy for HNP
   b. Decompression and Fusion i.e. Open TLIF, MIS TLIF or DLIF

** The final operative list / cases will be decided on 16th March 2017 during the pre-operative assessment. 8 – 10 cases will be selected from the above list for live surgery telecast during the entire 3-day course.*

DAILY PROGRAM
DAY 1 ▪ 16TH MARCH 2017 (THURSDAY)

0830 – 0900	Registration of Participants
0900 – 1200	Pre-Operative Cases Discussion
1400 – 1530	**SAW BONES WORKSHOP 1** Thoracic Pedicle Screw, Lumbar Pedicle Screw and S1 Screw Fixation *Yat Wa Wong, Chris Yin Wei Chan*
1530 – 1700	**SAW BONES WORKSHOP 2** Posterior Instrumentation of Cervical Spine i.e. C1/C2 Fixation, Lateral Mass and Cervical Pedicle Screw Fixation / Anterior Cervical Discectomy Fusion *Kuniyoshi Abumi, Dato' K S Sivananthan*

DAILY PROGRAM
DAY 2 ▪ 17TH MARCH 2017 (FRIDAY)

0800 – 0830	Registration of Participants
0830 – 0900	**OPENING CONFERENCE** The Organizing Chairman's Welcome Speech ***Rohit Pokharel*** The APSS President's Welcome Speech ***Kuniyoshi Abumi***
0900 – 0915	How to Interpret Basic Radiographs? [PAGE 15] ***Chris Yin Wei Chan***
0915 – 0930	Magnetic Resonance Imaging (MRI) Lumbosacral Spine Made Easy [PAGE 16] ***Mun Keong Kwan***
0930 – 0945	Evolution of Classification in Thoracolumbar Fractures [PAGE 17] ***Rabindra Pradhan***
0945 – 1000	MIS TLIF: Tips and Tricks [PAGE 18] ***Arvind Jayaswal***
1000 – 1015	TLIF with Cortical Pedicular Screw Fixation [PAGE 19] ***Dato' K S Sivananthan***
0900 – 1700	**LIVE SURGERY** Operation Theatre 1 Operation Theatre 2

DAILY PROGRAM
DAY 3 ▪ 18TH MARCH 2017 (SATURDAY)

0830 – 0845	Discussion and Evaluation: Post-Op Cases Done on DAY 2
0845 – 0900	Pyogenic Spine Infection – Diagnosis and Management [PAGE 20] ***Rohit Pokharel***
0900 – 0915	Management of Post-TB Kyphosis [PAGE 21] ***Yat Wa Wong***
0915 – 0930	Surgical Management of Cervical OPLL: Anterior or Posterior Approach? [PAGE 22] ***Kuniyoshi Abumi***
0930 – 0945	Sagittal Correction of T-L Kyphosis in Ankylosing Spondylitis [PAGE 23] ***Jae Yoon Chung***
0945 – 1000	Adolescent Idiopathic Scoliosis – Operative Management Strategies [PAGE 24] ***Udai De Silva***
0830 – 1700	**LIVE SURGERY** Operation Theatre 1 Operation Theatre 2
1700	Closing and Certificate Presentation

ABSTRACTS

HOW TO INTERPRET BASIC RADIOGRAPHS?

Chris Yin Wei Chan

Department of Orthopaedic Surgery, Spine Unit, Faculty of Medicine,
University of Malaya, Kuala Lumpur, Malaysia

Plain radiography remains the mainstay of radiological investigation for spinal pathology. However, the use of plain radiography is often poorly understood even among orthopedic practitioners. In this lecture, we will discuss the basic concepts in utilization of plain radiography in the diagnostic workup of spinal conditions. Specifically, we will discuss use of dynamic films to demonstrate the presence in instability and how this would assist in patient management. We will also highlight specific findings on plain radiograph which should alert the physician of a more sinister underlying condition. The use of plain radiography in patients who presented with red flag signs will also be presented.

MAGNETIC RESONANCE IMAGING (MRI) LUMBOSACRAL SPINE MADE EASY

Mun Keong Kwan

Department of Orthopaedic Surgery, Spine Unit, Faculty of Medicine,
University of Malaya, Kuala Lumpur, Malaysia

Magnetic Resonance Imaging (MRI) scan is a non-invasive radiological imaging which uses a powerful magnetic field and radio frequency pulses to produce detailed pictures of the internal body structures. MRI scan has revolutionized the management of different type of spinal pathology by improving the ability to make more accurate diagnosis and therefore an appropriate treatment can be instituted.

MRI lumbosacral spine i.e. axial views can be easily comprehended by understanding the concept of 'Three Floor Anatomy House' proposed by McCullough et al 1997. In the storey 1, intervertebral disc, facet joints and traversing nerve roots (vertebral below) will be well visualized. Occasionally, the far lateral disc compressing the exit nerve root (vertebral above) can be diagnosed. Whereas, in storey 2, the dorsal root ganglion (vertebral above) will be visualized over the foraminal region. In the storey 3, the pedicle (vertebral above) and the corresponding neural structures will be visualized. Based on this concept, the compression site of the neural structure can be easily identified and a proper surgical strategy can be carried out. In prolapsed disc, MRI will not only allow the identification of the severity but also location (i.e. axilla or shoulder) as well as type (i.e. extrusion or sequestration) of the prolapsed disc. In early lumbar stenosis resulting subarticular stenosis (i.e. lateral recess), MRI scan will allow visualization whether the traversing nerve root is trapped (compressed) or escaped (free). This information will allow us to avoid unnecessary surgical decompression.

MRI scan can be used to identify the conjoined nerve root in lumbosacral region prior to surgery. Identification of this anomalies is paramount important especially in MIS-TLIF where the conjoint nerve root will be potentially injured during this procedure if the diagnosis is missed. In addition to that, MRI scan can also use to diagnose synovial cyst, flavum cyst, facet arthrosis as well as Modic changes which can occur during the unstable phase of the degenerative disc.

In conclusion, MRI has revolutionized the management of degenerative disc disease in lumbosacral spine. A good knowledge on the basic MRI scan is required for a sound and safe surgical decision.

EVOLUTION OF CLASSIFICATION IN THORACOLUMBAR FRACTURES

Rabindra L Pradhan

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Classification systems can help us in understanding of diseases and improve management. An ideal classification should be comprehensive yet simple and should facilitate communication between surgeons and guide in treatment methods. Over the years various classification systems have given the importance of biomechanical stability, injury mechanisms and lately on neurological status. With better understanding of the fundamental basis of classification, it is possible to devise plans for therapeutic and prognostic parameters, although variable patient-related factors bring uncertainty into the decision-making process. Each successive classification system has played an important role in progressive understanding of thoracolumbar injuries since Boehler's first effort some eight decades ago. Most systems were based on single individuals or a small group's retrospective review of cases which were never validated. In the last decade the TLISS/TLICS system incorporated patient's neurology and also claimed to assist in deciding a surgical treatment for the patient. In reality, this was more of a scoring system than a far reaching classification system. The new AO Spine thoracolumbar spine injury classification system brings together the best of the AO and TLICS systems with different grades of neurological involvement and case specific modifiers. This system further takes the consideration of age, BMD and other co-morbidities as well. This system represents the most recent evolution as it combines several important factors that help in the management of these injuries. Recently this system has shown that it is independent of region and experience and with the incorporation of Spine Injury Score, this system may allow the development of a global treatment of thoracolumbar trauma. Nevertheless, more research needs to be performed regarding its long term reliability and validation.

MIS TLIF: TIPS AND TRICKS

Arvind Jayaswal
Department of Spine Surgery, Primus Super Speciality Hospital, New Delhi

Transforaminal Lumbar Interbody Fusion (TLIF) was first reported by Blume et al in 1980s and later advocated by Harms and Rolinger. When compared to Posterior Lumbar Interbody Fusion, TLIF procedure has advantages in being an unilateral procedure with less neural element/dural retraction and preservation of midline structures. TLIF has been proven to be a safe and effective technique but morbidities in view of extensive muscle stripping and retraction is a matter of concern. Foleys et al in 2003 described minimally invasive TLIF which utilised tubular retractors via muscle dilating approach thereby reducing iatrogenic soft tissue injury and ischemia with preservation of certain vital muscle attachments.

MIS TLIF has been reported to have better postoperative functional scores, lesser intra-operative blood loss, lesser hospital stay and early return to work with similar operative time, complication and fusion rates when compared to Open TLIF. However, all the benefits of MIS TLIF come at the expense of higher intra operative radiation to the surgeon which has been well documented in literature.

TLIF is indicated primarily in Degenerative Disc Disease in lumbar spine and spondylolisthesis. Once it gained in popularity the indications were extended to other conditions like infective, traumatic, discal and paradiscal lesions where a global fusion with short construct helps in stabilising the lumbar spine.

Level 2 studies have shown a higher complication rate, re operation rate and re admission rate during the initial phase of learning curve in MIS TLIF. Hence repeated strict training in the form of direct observation, simulated/cadaveric training and supervised operating is necessary. Mastering the surgical and radiological anatomy and proper visualisation of pedicle anatomy under image intensifier guidance is of paramount importance for accurate percutaneous pedicle screw as well as port placement. Adequate discectomy and thorough end plate preparation are mandatory for good fusion rates similar to open TLIF procedure. Microscope or light source mounted on tubular retractors may be used during interbody fusion for proper visualisation and gaining access. The surgeon should master his minimally invasive instrumentation system and should never hesitate to convert the procedure to an open surgery if required, keeping patient safety paramount at all times.

Over all MIS TLIF is an efficient and safe procedure, when done for the right indications using right tools and by a trained spinal surgeon, who has negotiated the steep learning curve by his dedication and focus to understand this art.

TLIF WITH CORTICAL PEDICULAR SCREW FIXATION

Dato' K S Sivananthan
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Midline lumbar fusion (MIDLF) using cortical pedicular screws is a new alternative for minimally invasive surgery.

This technique has the following benefits :-

1) Small incision (4-5 cm) (same as the laminectomy incision)
2) No extension needed for screw insertion
3) Less muscle damage
4) Almost 0 muscle retraction
5) Less blood loss
6) Higher pull out strength and equivalent construct strength vs. traditional PS fixation

The cortical screw fixation is from the inframedial aspect of the pedicle to the supralateral aspect of the pedicle. The cortical screw which is usually 4.5 – 5 mm is inserted obliquely.

This fixation for spinal fusion has the following advantages :-

FIXATION

- Trajectory maximizes cortical bone contact

VISUALIZATION

- Single small midline incision
- Familiar open anatomy with clear visualization
- Not restricted by a tubular retractor

PRESERVATION

- Less muscle disruption than traditional open technique
- Less neurovascular elements compromised
- Capsules of posterior joints not damaged
- Less blood loss

PYOGENIC SPINE INFECTION – DIAGNOSIS AND MANAGEMENT

Rohit Pokharel

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Maharajgunj Medicine Campus, Tribhuvan University Teaching Hospital, Kathmandu, Nepal

Pyogenic vertebral osteomyelitis is one of the commonly encountered vertebral infections, which may develop from direct open spinal trauma, postoperatively, spread of infections from adjacent structures, from hematogenous spread of bacteria to a vertebra. A lumbar vertebra is most frequently involved, and usually two or more vertebral bodies are involved.

Proper clinical evaluation with high index of suspicion, augmented with relevant radiological, laboratory and microbiological investigations is key in diagnosis of the condition. Differentiating pyogenic spine infection from other similar conditions, particularly tubercular spondylitis, is often challenging. The natural course of the disease might be self-resolution to devastating complications like permanent neurologic deficits, significant spinal deformity, or death.

Treatment options for vertebral osteomyelitis depend on the severity of the infection. Any infection is a medical disease; therefore non-surgical treatment with intravenous sensitive antibiotics is mandatory. Surgery is indicated in selected cases, depending on the extent of disease, neurological deficits, instability and deformity in the spine. Surgical approach is selected accordingly with or without instrumentation. Post-operative follow up includes antibiotic treatment, orthotic support, rehabilitation program and nutritional supplement.

Spinal infection should always be a differential diagnosis of pain in the back. Early diagnosis and proper treatment will treat the condition adequately.

KEY WORDS

infection, pyogenic, spine

MANAGEMENT OF POST-TB KYPHOSIS

Yat Wa Wong

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Tuberculosis of spine (TB Spine) can be successfully treated by anti-TB drugs alone. Most surgeons prefer surgical decompression if patients had neurological deficit due to spinal cord compression. The indication for post-tuberculous kyphosis is less clear-cut. Factors that may affect decision include severity of the kyphosis, location, age, associated instability, progression of deformity and so forth. TB spine induces granulomatous reaction of the host immune systems to destroy their own spine. Therefore, TB spine tends to affect multiple vertebral segments and has much higher propensity to cause severe kyphosis than pyogenic infection.

With the same degree of kyphotic angle, the implication to the cervical and lumbar spine are more severe. Since their normal sagittal alignment is in lordosis, any kyphosis means deformity plus loss of lordosis. In the thoracic spine, it has a range of normal kyphosis of about 20 to 40 degrees. If the TB spine patients have some thoracic kyphotic deformity, it can easily be compensated and may not be cosmetically apparent.

TB spine can appear in young children and disturb their spinal growth. The initial kyphosis may not be severe, but the kyphotic angle may gradually increase throughout their growing period. Close monitoring of the spinal sagittal alignment is essential to prevent severe angular deformity that may eventually lead to very poor cosmetic appearance, Pott's paraplegia of late onset and impaired cardiopulmonary function.

Significant kyphosis after acute TB spine can be corrected by anterior, posterior or combined approaches. Instrumentation to correct the deformity and give a stable construct is shown to be safe. All these approaches can give reasonably good result and have literature support. The choice of the techniques is based on patients' general condition, characteristics of local pathology and the expertise of surgeons. Severe established cases of severe angular kyphosis with secondary truncal changes are a totally different story. If patients are relatively young, deformity correction may still be possible through various kinds of spinal osteotomies. Prolonged period of halo traction may help the correction. For middle age or elderly patients, kyphosis correction is difficult and involves high risk. Deformity correction for cosmetic reason is not recommended. In case if patients develop paraplegia of late onset, internal kyphectomy with or without fusion is an alternative option.

SURGICAL MANAGEMENT OF CERVICAL OPLL: ANTERIOR OR POSTERIOR APPROACH?

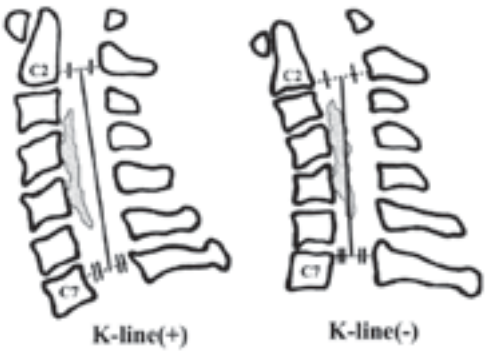
Kuniyoshi Abumi

Center for Spinal Disorders, Sapporo Orthopaedic Hospital, Hokkaido University, Japan

Patients with myelopathy caused by ossification of the posterior longitudinal ligament (OPLL) require surgical intervention. Direct anterior decompression by floating or excision of OPLL is effective for ventrally compressed cervical spinal cord by OPLL. Decompression through posterior approach is also effective for major cases of OPLL in the cervical spine with physiological lordosis. Posterior procedure include several types of laminoplasty have been developed for cervical OPLL. There are controversy for selection of surgical procedure among the spine surgeons.

Suda and Abumi showed that kyphotic alignment of the cervical spine is major factor causing poor surgical outcome after laminoplasty for cervical spondylotic myelopathy. Fujiyoshi et al proposed the K-line defining as a line that connects the midpoints of the spinal canal at C2 and C7 (Fig). They demonstrate that a sufficient posterior shift of the spinal cord and neurologic improvement will not be obtained after posterior decompression surgery in the K-line (-) group. Matsumoto et al showed that preoperative kyphosis of the cervical spine and severe (>60%) compromise of the spinal canal by OPLL appear to be the limiting factors for the indication of laminoplasty. Yoshii et al demonstrated that the postoperative recovery rate was similar in the posteriorly and anteriorly managed groups, and in patients with massive OPLL with kyphotic alignment, neurologic recovery rate in the anterior was superior to that in the posterior. However, they resulted that the occurrence of perioperative complications was more common in the anterior group.

Surgical procedure for cervical OPLL must be selected considering cervical alignment in the sagittal plane, canal occupying ratio by ossified ligament, types of ossification, etc.



SAGITTAL CORRECTION OF T-L KYPHOSIS IN ANKYLOSING SPONDYLITIS

Jae-yoon Chung, MD

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Indication of correction surgery is in difficulty of front vision, walking difficulty, respiratory and G-I symptoms from the pressure of costal margin on the contents of upper abdomen. In addition to improvement of function, improvement of appearance is also very important to the patients.

Spinal osteotomy is a demanding procedure for which proper training and experience are mandatory. Surgeon should be familiar with several options available.

SMITH-PETERSON OSTEOTOMY

It is an excellent option for correction of smaller degree of spinal deformity. Bone is removed through the pars and facet joints. Removal of underlying ligaments is helpful in preventing buckling of dura or iatrogenic spinal stenosis. Approximately 10 degrees of correction can be get with each 10mm of resection. Multilevel posterior column osteotomy is advocated by Ponte and Zielke.

PEDICLE SUBTRACTION OSTEOTOMY

It is best suited for significant sagittal imbalance of 4 cm or more and immobile or fused discs. 30dgrees or more of correction can be obtained with a single posterior osteotomy, preferably at the level of deformity. If the deformity is at the spinal cord level, pedicle subtraction can be used. Compression instrumentation is used along with simultaneous flexion of operating table.

EGGSHELL OSTEOTOMY

It is reserved for severe sagittal imbalance more than 10 from the midline. This is a spinal shortening procedure with anterior decancellization followed by removal of posterior elements, instrumentation, deformity correction, and fusion.

ADOLESCENT IDIOPATHIC SCOLIOSIS – OPERATIVE MANAGEMENT STRATEGIES

Udai De Silva

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Scoliosis is a complex, three-dimensional deformity of the spine that comprises a lateral curvature, thoracic lordosis and a posterior rib hump. If left untreated, the condition results in altered spinal mechanics and degenerative changes which lead to pain and loss of spinal mobility. There are also psychological consequences that result from the unsightly and deformed shape of the back: A restricted social life, lower marriage rate etc. Adolescent idiopathic scoliosis (AIS) is the commonest type of scoliosis in children between 10 and 18 years and it affects 1 in 250 adolescents. AIS curves progress during the rapid growth period and slow their progression at skeletal maturity but curves greater than 600 continue to progress even during adult life. The surgical treatment is often indicated in adolescents whose curves are greater than 450 while still growing and it is rewarding considering the above consequences.

The goal of surgery is to prevent curve progression by fusion with bone grafts supported by instrumentation and to achieve some curve correction. The surgical strategy is either posterior approach or anterior approach and in very stiff, high magnitude curves there is a necessity for combined anterior and posterior surgery as a single or two stage procedure. The surgical strategy is usually based on the classification of AIS (Lenke), skeletal maturity and the remaining growth, curve magnitude and stiffness of the curves which are assessed clinically and radiologically.

Posterior fusion with instrumentation has long been the standard for the surgical treatment of AIS. The last two decades have seen a gradual shift of usage from hook-based instrumentation systems to hybrid-based systems to all-pedicle screw systems with more anchors to the spine. This shift has enabled greater anchorage and correction manoeuvres and reduced the implant failure rate and increased fusion rates. In high magnitude, stiffer curves posterior osteotomies in the form of Ponte osteotomies are employed. These osteotomies although cause added morbidity to the procedure give the surgeon the freedom of achieving better curve correction.

Anterior surgery was previously favoured for thoracic and lumbar scoliosis. It enables shorter fusion levels with multilevel discectomies and convex epiphysiodesis with bone grafting with or without instrumentation. Modern techniques with segmental spinal instrumentation reliably provide a better arrest of progression of the deformity and achieve greater correction of the curves in the coronal plane (30% to 90%) with minimal loss at follow-up and also achieve a spontaneous partial correction of the compensatory curves and improve appearance.

NOTES