Spinal surgery has changed since I graduated as a young neurosurgeon in 1991. There is tremendous growth in this field due to fast infusion of newer technologies, aggressive growth in medical facilities, acceptance of the need for a change among experienced surgeons, increased number of overambitious young surgeons and neurosurgery students, well-matured and globally accepted neurosurgical and spinal surgery societies and associations, and overall, a stronger and prosperous India. During the initial period in my career, I had innumerable opportunities to indulge in spinal surgery when skull base and vascular neurosurgery were considered very special among newer-generation surgeons in late 1980s and early 1990s. Many of the adventures became routine, regular practice by 20th century, and this paved a way for newer techniques and refinements in spinal surgery. Here are a few experiences that made me to think and wonder why some of the newer technologies flourished and why others needed more advancement.

**Three-column Theory and Pedicle Screw Fixation**

Denis’ three-column theory is well read by all neurosurgeons, and the destruction of two of the three columns means instability. That is how pedicle screw stabilization surgery started when I was asked to decompress (laminectomy) in a wedge compression fracture of D12 with paraparesis, where my request of using a posterior pedicle screw plate (Steffee) system was accepted by my then-chief Dr AN Subba Rao. The use of an electrical drill in pedicle drilling was never heard of earlier in India and was used with precision in the first pedicle screw placement, and the surgeon (myself) was not aware of the elaborate arrangements made by my chief to tackle complications, if any were to occur. The arrangements included having the thoracic surgeon (Dr TM Joseph) and urologist (Dr George K Abraham) to stand by until the procedure progressed well. Subsequent to this, there was no stopping of using pedicle screws and plates in unstable dorsal, lumbar, and sacral spines. Kerala has a large number of patients accidentally falling from palm trees while procuring toddy and harvesting coconuts. I considered these as the commonest causes of thoracolumbar fractures in Kerala. The hard-learned techniques with plates vanished later with the introduction of rod systems and polyaxial screws, which are found user-friendly in the present era. Drills have never been used lately and I hardly find anyone using it today. Prof PS Ramani, who was my mentor and guide, in fact asked me to remove the slide showing me operating with the drill looking at C-arm image. His contention was that introduction and teaching of pedicle screw fixation with drill was not necessary in India, and it may even inhibit the growth of the technique since it needed precision. I never displayed that slide after that, which I had considered proudly belonging to an aggressive young neurosurgeon in his budding career. Subsequently, I realized that my mentor’s interest in development of this field was a foresight for success.

**Odontoid Fracture Type II and Lateral Malleolar Screw**

Management of odontoid fractures is always interesting and type II, in particular, is notorious for malunion, if not fixed properly. With a good cannulated lag screw with special instruments and biplanar imaging, it is easy to perform ventral screw fixation within 60 minutes. However, two decades ago, it was challenging to perform this technique. When I received the right patient then, nothing was available except a good C-arm and an excellent radiographic technician (Mr Ahshan—we call him so). Using the single C-arm with well-coerced repeated anteroposterior and lateral views (trialed on the previous day with one of my residents as model), the C-arm was fixed in position at the head end in the operation theater on the previous day itself. I chose a lateral malleolar lag
screw from my orthopedic colleague (Dr Nandakumar) to fix the odontoid type II fracture through a wide extra (retro)pharyngeal approach. Though I could not get a bicortical purchase, the single thick screw was placed in the odontoid peg with a fracture gap of 2 mm. A good external immobilization with a Philadelphia collar was given. Believe me, we achieved a good fusion in this case along with excellent clinical results (Fig. 1). This single case showed that a single screw was sufficient and a very tight lag was not needed to achieve fusion as demanded in the literature. Dr Penteleni, a Hungarian neurosurgeon, was delighted to see this since the biplanar imaging and cannulated screws were available in Europe. This case became the pilot case in India with repeated presentations and a later publication in Neurology India. Amazingly, I have read articles depicting fracture of cannulated ventral screws before and after good fusion. This is due to the fact that in fused bone, the matrix can grow to an axis against the direction of implanted screws. Screws broken before are worrisome and may need alternative or repeated surgery, while those after fusion can be left alone since they are symptomless (Fig. 2).

**Kyphotic Cervical Spine and Simple Reconstruction Plate**

A young lady medical officer was unable to bend herself comfortably, while assisting cesarean section and was not able to swallow solid food for some reason. She had a sharp neck pain after a jerk while in an auto ride in Cochin, and was brought to me by her gynecology chief with X-ray cervical spine that showed significant erosion of C3/4 vertebral bodies, kyphotic spine, and a large prevertebral shadow (Fig. 3A). The magnetic reso-
nance imaging (MRI) showed significant kyphosis and cord compression (Fig. 3B). Amazingly, she had intact neurological status. There was significant discussion on management protocols, but finally she consented to undergo surgery. The lesion was approached through an extrapharyngeal anterolateral approach, large prevertebral cold abscess opened and drained, spinal dura decompressed by removing granulation tissues, and, subsequently, a tricortical long iliac bone graft was placed between C2 and C5 and stabilized the cervical spine with a simple stainless reconstruction plate and cortical screws between C2 and C5. This procedure addressed all our concerns, particularly in maintaining the cervical spine, thus preventing possible progression of kyphosis (Fig. 4A). Tuberculosis of spine ends with deformation, if untreated, with its endpoint being kyphosis. Management of delayed compression and correction of cervical kyphosis is a daunting task, particularly in cervical spine. The young lady doctor improved well with antituberculous medical management and I observed her until I left Cochin in December 1998. It was always interesting to see the X-rays with those simple stainless recon plates on C-spine, and I recently observed one such modified plate being used elsewhere. To my great surprise, one day after 20 long years (2017), she visited me at Coimbatore. It was our collective decision to check her cervical spine X-rays after 20 years with great curiosity, as we both wanted to know how it looked like now. X-rays were taken and it was perfect with no difference between now and then (Fig. 4B). The low-cast simple implant has done an excellent job for this young lady, leaving many, many questions in my mind. Do you really need so many developments in implant modifications at such a fast rate in the name of achieving better results? A simple recon plate was looking as good as today’s sophisticated plates with locking screw heads, self-tapping cancellous and cortical screws, etc. Though the metallurgy needed change from stainless steel to titanium due to compatibility for MRI,
too many changes in designs are indeed not necessary at all. A perfect technique is all we need to achieve long-term good results.

**Trans-sternal Approach for D3 Vertebral Body Lesion: Too Big Now**

Approaching a vertebral body lesion at the upper dorsal spine was another challenge that took us to try the trans-sternal approach, which was a regular corridor for cardiothoracic surgeons. Though exposure was large and luxurious, complete surgical work on the vertebral body lesion was above the aortic arch and in between the right common carotid and left carotid artery. The corridor was deep and interbody iliac crest graft was possible. Anterior instrumentation was never attempted due to the anteriorly placed arch. That was my first and last case using that approach, thanks to Dr TM Joseph, cardiothoracic surgeon in 1993. Subsequently, we graduated to the Sundaresan and Sundaresan approach and the claviculomanubrial approach for all lesions above D3 vertebral body after assessing the anatomical position of arch of aorta and manubrial notch. The morbidity is low in these approaches when compared with trans-sternal approach, though the working corridor is narrow, and we do not see the structures that we do not need to see in this surgery. High illumination and magnification are sufficient.

**Lateral Mass Screw Plate Fixation: Roy Camille to Magerl**

One technique that was always in my mind after reading articles from Europe was placing a screw in the lateral mass of subaxial cervical spine C3 to C6. It was always our teaching and practice to expose the spine and lamina as much as we need for a good laminectomy, which was the golden technique to address many of the diseases at the cervical, dorsal, and lumbar spine in the 1980s. Dissecting beyond the border of lamina was neither needed nor encouraged during our postgraduate period until the pedicle screw placement in the lumbar spine came into practice, and the posterolateral bone grafting was advocated aggressively. While placing lateral mass screws, the aim is not to injure the vertebral artery and nerve roots anteriorly. The only easy way to do this was to perform Roy Camille’s technique by using a small screw (10 mm) to drive it straight from the midpoint of the lateral mass. My first and last case with this technique did not satisfy me because the reduction was not maintained after surgery. We used simple plates that were not excellent for the procedure, and that led me to lean toward Magerl’s technique of bilateral cortical purchase of screws that were placed in the safe superolateral quadrant of the lateral mass with screws directed 35° superiorly and laterally from a point slightly superior and medial to midpoint of lateral mass. This was extremely strong and satisfactory. We improved our technique and went on to producing educational videos in 1995 itself. To me, it is the most elegant technique I have ever done at C3 to C6, and I prefer this to pedicle screws in these regions, obviously for their associated higher risk rate.

**SUGGESTED READINGS**


