

A 12-year-old girl from Kyrgyzstan suffered from a 130-degree curvature of the spine due to Scoliosis Dorsolumbar, a rare condition that caused her spine to curve severely and left her unable to walk.

3D Printing Supports Treatment for Dorsal Scoliosis

Aakash Healthcare Uses Stratasys' J5 MediJet™ to create 3D Printed Pre-Surgical Model and Jigs to Correct Scoliosis Deformity

[Aakash Healthcare Super Specialty Hospital](#) treats the most complex cases in the National Capital Region (NCR) of Delhi, Dwarka. The hospital, equipped with state-of-the-art infrastructure and technology, and compassionate, world-class clinicians and staff, is well known for its leading care in Orthopedic and Joint replacement surgery

To achieve the highest patient satisfaction and to provide the best healthcare service to the local community and beyond, Aakash Healthcare has set up a modern 3D printing lab on its premises known as Cure *c* 3D. This lab will be used to help surgeons and clinicians create 3D models of complex clinical cases for the purpose of patient education and surgical treatment planning, and to print patient-specific jigs and medical devices that will ensure safe and accurate surgical interventions.

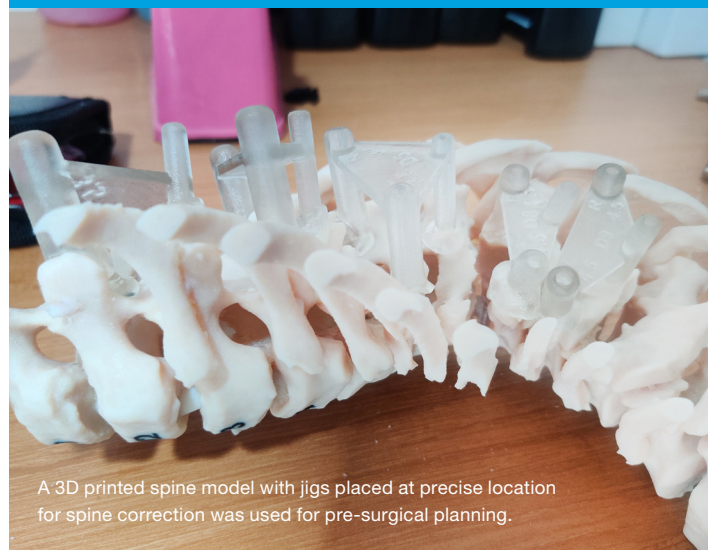
In addition to creating high-quality models for patient education, resident teachings, and practicing complex surgeries in vitro outside the OT, the lab will go a long way to bring innovative solutions to complex and difficult clinical cases.

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The importance of 3D printing in the healthcare industry is increasing day by day and the impact is significant in terms of patient education, pre-surgical planning, and the total point of care.

Dr. Aashish Chaudhry

**Managing Director and Senior Consultant
Orthopedics, Aakash Healthcare, New Delhi**



A 3D printed spine model with jigs placed at precise location for spine correction was used for pre-surgical planning.



Treating Scoliosis Deformities from a **New Perspective**

The Challenge

A 12-year-old girl from Kyrgyzstan came to Aakash Healthcare, New Delhi because she suffered from a rare condition that affects approximately three children in every one hundred thousand called Progressive Scoliosis Dorsolumbar. Dorsal scoliosis affects the portion of the spine between the bottom of the neck and the top of the pelvis and causes a severe curvature. In her case, a 130 degree curve, in addition to pelvic misalignment caused by different-sized hips, was causing severe pain that left her unable to walk and was only getting worse.

The Solution: Biocompatible 3D Printed Jigs

The 12-year-old patient underwent a 16-hour spine surgery in two phases by the Ortho-Spine division at Aakash Healthcare. Custom-made 3D printed jigs played an important role in pre-operative planning, giving the surgeons an opportunity to practice the complicated screw insertion procedure on a 3D printed model which was a traced copy of the deformed spine. In the first stage of surgery, which lasted six hours, soft tissue adhesions were removed, and multiple osteotomies, or bone cuts, were used to increase the spine's flexibility while correcting the alignment in the coronal plane. The second phase of the surgery involved the insertion of several titanium screws. The positioning of the screw, its size, length, and direction was performed with the help of biocompatible 3D printed jigs.



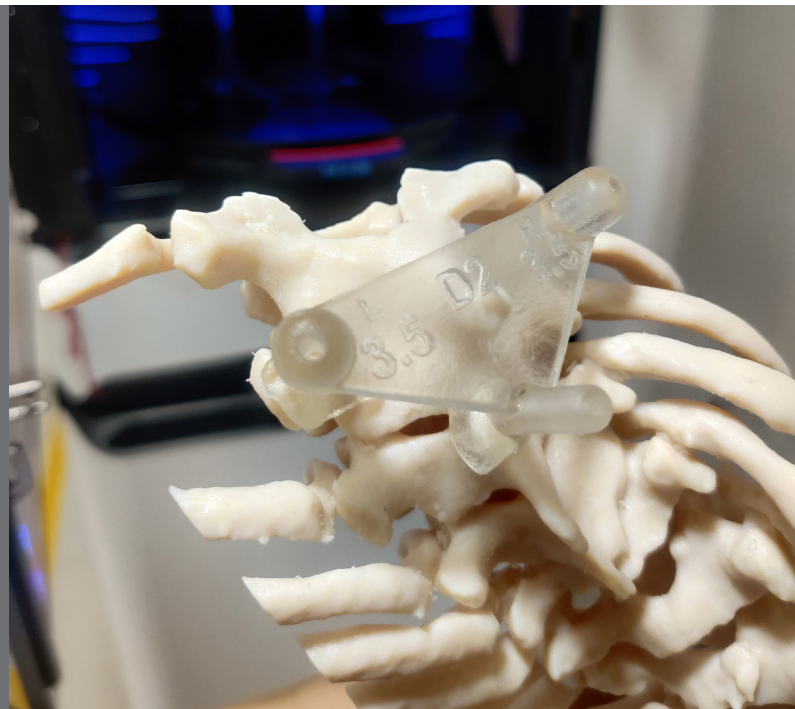
3D printed spine models show the patient's abnormal curvature at multiple stages of care: pre-operatively, after the first surgery, and after the second surgery when 3D printed jigs and titanium screws were used to position the spine.

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Due to the spine's severe deformity and the difficulty in inserting screws, the 3D printed jigs served as a crucial component to execute the surgery safely and without complications. The 3D print aided in surgical planning by calculating the size of the bone pedicles through which screws were put.

Dr. Nagesh Chandra,

**Senior consultant, Spine Surgery,
Aakash Healthcare**



A MED-610 biocompatible 3D printed jig was created using the Stratasys J5 MediJet all-in-one 3D printer



3D printed models of patient-specific jigs were printed using the Stratasys J5 MediJet 3D printer in Med-610 biocompatible material.



A sterilized 3D printed jig was used during surgical treatment for accurate positioning and placement of titanium screws.

Patient-Specific Accuracy: The Key to Success

Custom-made 3D printed jigs played an important role in pre-operative planning and gave the surgeons an opportunity to practice the complicated screw insertion procedure on a 3D printed model which was a traced copy of the deformed spine.

With the help of the [Stratasys J5 MediJet](#)¹ all-in-one 3D printer and MED610 biocompatible material, the care team was able to 3D print highly-accurate, patient-specific custom jigs which were steam, Gamma and EtO sterilizable for clinical application and could make contact with tissue and bone during operative measurements.

Dr. Chandra added, “At every stage, 3D printing helped to plan the screw’s size, length, and direction. The most important feature is that it considerably lowered the risk of neurological complications and the associated problems. We could achieve almost 70 percent to 80 percent correction after surgery. Now her spine curvature has been reduced to just 30 degrees.”

¹The Stratasys J5 MediJet printer is also ISO 13485:2016 certified. Results from case studies are not predictive of results in other cases. Results in other cases may vary.



Mr. Priyank Yeolekar works on a digital model of a deformed spine for accurate positioning of jigs for screw insertion.

About Altem Technologies Pvt. Ltd

[Altem Technologies Pvt. Ltd.](#), awarded one among “Top 100” companies in India by SME India Forum, is an engineering firm with core strengths in Product Life Cycle Management, Advanced and Additive Manufacturing (AM) Solutions and 3D Digitization Technologies. Altem offers a complete solution around and aspires to be a one stop for all [3D Printing](#), [3D Scanning](#), [CAE](#), [PLM](#) and [Life Sciences](#) needs, with a wide spectrum of products for engineering & life sciences companies in India.

Stratasys Headquarters

7665 Commerce Way,
Eden Prairie, MN 55344
+1 800 801 6491 (US Toll Free)
+1 952 937-3000 (Intl)
+1 952 937-0070 (Fax)

1 Holtzman St., Science Park,
PO Box 2496
Rehovot 76124, Israel
+972 74 745 4000
+972 74 745 5000 (Fax)

stratasys.com
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