Research Achievements

Dr. Bhavuk Garg's diverse contributions reflect a commitment to advancing spine surgery safety, accessibility, and innovation, showcasing leadership both in research and community outreach.

Promoting Safe Spine Surgery: Dr. Bhavuk Garg has been engaged in efforts to enhance the safety and sustainability of spine surgery through research targeted at reducing the risk of complications associated with spine surgery. The following are his contributions to this end:

1) Pioneered the use of 3D printing technology and rapid prototyping in India for 'safe' screw placement in complex spinal deformity surgery. Conducted the first comparative study proving the benefits of using patient-specific 3D printed jigs for pedicle screw placement in scoliosis.
   Published: Garg B, Gupta M, Singh M, Kalyanasundaram D. Outcome and safety analysis of 3D-printed patient-specific pedicle screw jigs for complex : spinal deformities a comparative study **The Spine Journal 2019.**
2) Reported the use of a modified technique of posterior vertebral column resection – one of the most challenging spine surgeries, known to have a complication rate of 40%-50%. Dr Garg's modified technique was associated with a lower rate of neurological complications.
   Published: Garg B, Mehta N. Modified Posterior Vertebral Column Resection for Severe Spinal Deformity: A Retrospective, Comparative Study. **The Spine Journal, 19, 2020,**
3) Developed a multidisciplinary Enhanced Recovery after Surgery (ERAS) protocol for lumbar spine surgery. ERAS is a patient-centric approach to perioperative care of patients who are operated upon – where strategic interventions are made in the course of a patient's surgical journey to make the patient's recovery smoother and faster. In a comparative study, the ERAS protocol was found to reduce the length of hospital stay and improve early patient outcomes.
   Published: Garg B, Mehta N, Bansal T, Shekhar S, Khanna P, Baidya DK. Design and Implementation of an Enhanced Recovery After Surgery (ERAS) Protocol in Elective Lumbar Spine Fusion by Posterior Approach: A Retrospective, Comparative Study. **Spine, 2020**
4) Enhanced understanding of various aspects of T.B Spine specially relevant to Indian population. (Published in The Bone & Joint Journal. 2022, https://doi.org/10.1302/0301-620X.104B1.BJJ-2021-0848.R2 , Indian journal of Orthopaedics, 2012, DOI: 10.4103/0019-5413.93682 (124 **Citations**), Asian Spine J. 2019, doi: 10.31616/asj.2018.0217, 2021 DOI: 10.31616/asj.2021.0137, Global Spine Journal. 2021, DOI: 10.1177/2192568220967931

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5) Performed the first ever O-arm integrated robot-assisted spine surgery in India with the Excelsius GPS spinal robotic system. The integration of robotic assisted technology in spine surgery improves accuracy of pedicle screw placement, First cervical pedicle screw with robotic guidance.(Journal of Clinical Orthopaedics and Trauma, DOI: 10.1016/j.jcot.2020.04.034.

6) **Significant contribution to the field of complex spinal defromities. Papers Published (Spine Deformity, 2020,** DOI: 10.1007/s43390-020-00104-6, Spine Deformity, 2020, DOI: 10.1007/s43390-020-00106-4, The Spine Journal, 2020, DOI: 10.1016/j.spinee.2020.04.014, Journal of clinical orthopaedics and Trauma. 2020, DOI:https://doi.org/10.1016/j.jcot.2020.07.024, Spine 2021, doi: 10.1097/BRS.0000000000003796, Spine, 2021, DOI: 10.1097/BRS.0000000000003869, Journal of Pediatric Orthopedics (Am), 2021, DOI: 10.1097/BPO.0000000000001694, Spine Deform 2021 https://doi.org/10.1007/s43390-021-00361-z, Spine Deform 2021, doi: 10.1007/s43390-021-00366-8.)

Novel implants and indigenous inventions: Strongly motivated by the 'Make in India' campaign, Dr. Garg has been associated with design of new implants and inventions: Including first Indian spine robot in collaboration with IIT Madras.

1) Design of an indigenous total elbow prosthesis in collaboration with Indian Institute of Technology, New Delhi. Current commercially available elbow prostheses are not designed for the Indian population. The indigenously developed elbow prosthesis is based on morphometric data acquired from CT scans of Indian patients and has unique modifications on its surface and implant design to improve the implant's biomechanical qualities. **(Received grant of INR 130 Lakh from ICMR for this work, Patent submitted for this work)**

2) Development of FlexiOH - a novel orthopaedic casting system for immobilizing and supporting fractured bones and joints. FlexiOH is a 'breathable', washable and lightweight splint - with use of FlexiOH, patients can avoid problems like excessive sweating, discomfort, itching, fungus and microbial growth and get complete healing for fractured body part. **one of the patent holder of FlexiOH ™ and got Gandhian Young Technological Innovation Award-2015.**

3) Development of low cost Indigenous Magnetic Growth Rod for Early onset Scoliosis patients. **(Received grant of INR 80 Lakh from ICMR in 2021).**

4) Faculty of school of International Biodesign.

5) Improved bone compression plate and its method of use thereof **Patent granted (2266/DEL/2011A)**

6) Submitted patent application for 1) RIP Screw, 2) Falcon Construct, 3) SCOV, 4) Spine robot in collaboration with IIT Madras.

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Translation research and basic sciences:

- Setting up of the State of the art 3D Gait Lab, Ortho genetic lab, 3D printing lab at All India Institute of Medical Sciences, New Delhi. Generates lots of data for gait patterns of various complex spinal deformities, osteoarthritis of knee, rheumatoid arthritis, ank. spondylitis of spine and hip and also generating database of gait patterns of healthy controls of Indian Population. **Published: Garg B**, Gupta M, Mehta N, Malhotra R. Influence of Etiology and Onset of Deformity on Spatiotemporal, Kinematic, Kinetic and Electromyography Gait Variables in Patients with Scoliosis – A Prospective, Comparative Study. **Spine, 2021,**
- Successfully completed a research project funded by the AO Trauma Association on the study of miRNAs in osteoporotic hip fractures. **Published in Indian Journal of Orthopaedics.**

Leadership in adversity

- Appointed as the chairperson of the COVID-19 taskforce of the Association of Spine Surgeons of India (ASSI). Drafted the guidelines for management of patients with spinal disorders amidst COVID-19 pandemic.
- Ran a Telemedicine OPD service and conducted several surgeries during the COVID-19 pandemic on patients with conditions requiring emergent intervention.

Community outreach: Dr. Bhavuk Garg recognizes the need of making healthcare accessible and equitable to all.

- Developed the ***ASICS*** (***A***IIMS ***S***pine ***I***nitiative from ***C***rooked to ***S***traight) mobile-based application. It is an easy tool to determine the quality of life of an operated patient and impart healthcare-associated education to the patient.
- Working for Integration and application of artificial intelligence in care of patients with scoliosis. **(Grant Sanctioned of INR 84 Lakh from ICMR in 2022).**
- Created Indian Fragility Fracture Network (IFFN) in 2017 to raise awareness for fragility fracture prevention in India.
- Cross-culturally adapted and translated the Scoliosis Research Society (SRS) -22r healthcare questionnaire to assess outcomes after scoliosis surgery in the Hindi language. This is the first ever adaptation of the SRS-22r in an Indian language. **Published in Spine Deformity, 2020, doi: 10.1007/s43390-020-00106-4.**
- Actively involved in a first-of-its-kind project of assessing the bone health in the transgender population.

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- Conducted school health screening programmes at several schools in New Delhi under the aegis of ASSI.
- Developed enhanced recovery protocols for spine surgery for which he got award in 2021 for Best New Methodologies and Techniques to Enhance Safety in Spine Surgery, DBT-Biotech Product Process Development and Commercialisation Award-2021, and GAPIO Karl Storz surgical excellence award-2021.
- Pioneered the application of **Artificial Intelligence** in spine surgery. (Received grant of INR 84 Lakh from ICMR in 2022).

ACADEMIC AWARDS

1. Medical dialogue Blackbuck research award 2024
2. IMA academic award 2024
3. DMA-Distinguished Medical Services award in the field of orthopedics 2023
4. NASI-Reliance 2022 award platinum jubilee award in Biological Sciences 2022
5. AOSYS SICOT India Award
6. Nuvasive SICOT award 2022
7. Sitaram Jaipuria Award for Emerging Young Leader in Medicine' for the year 2022.
8. SICOT Basic Sciences Award 2022
9. ASSI Basic Sciences Award 2022
10. DOA traveling fellowship 2022
11. DOA Best publication award >40 years category 2021
12. IOA silver jubilee Oration Award 2021
13. Award for Best New Methodologies and Techniques to Enhance Safety in Spine Surgery 2021
14. ISCR's – ACCRI National Award for Excellence in Academic Clinical Research 2021
15. DBT-Biotech Product Process Development and Commercialisation Award 2020
16. GAPIO Karl Storz surgical excellence award 2020
17. IFFN consolation prize for best slogan 2020
18. DOA best publication award more than 40 years of age 2019
19. DOA best publication award 2018 under 40 years of age
20. Asia Pacific Mimics innovation Award 2019
21. Worldwide Achiever healthcare personality of the year: Orthopedic Surgeon Award 2018

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22. Young Fellows Association (YFA)Liaison Representative to the American College of Surgeons Advisory Council for Orthopaedic Surgery.
23. One of the patent holder of FlexiOH ™: Winner of Gandhian Young Technological Innovation Award-2015
24. Recipient of American college of Surgeons: Young Fellow Mentorship program 2015-2016
25. Recipient of American college of Surgeons: Young Fellow Mentorship program 2015-2016
26. DBT "Innovative Young Biotechnologist Award 2013"
27. Prize for securing 100% marks in workshop " How to write research grant proposal", AIIMS, Aug 2012
28. Selected for AADO scholarship to attend OTA meeting in USA, 2012
29. Selected for Ambassadorship of IOA for Singapore 2012
30. Delhi orthopedic association publication award 2012
31. Delhi orthopedic association publication award 2013
32. Consolation prize in Hindi debate competition, AIIMS, Sep 2014
33. Delhi Medical Association gold medal for "Best outgoing grad uate of the year-2000" in MBBS
34. Dr. V.P. Chaddha memorial medal 2000 for being the best candidate in MBBS in Surgery held in 2000
35. Dr. Krishnkumar gupta award for standing first in Forensic medicine (MBBS-IInd prof.) held in 1999
36. Kanhayalal gulati award for standing first in Physiology (MBBS-Ist prof.) held in 1997
37. Ram chand dua award for standing first in Ist MBBS held in 1997
38. Merit award for standing first in aggregate in Ist MBBS held in 1997
39. Pothapragda award for standing first in Biochemistry (MBBS-Ist prof.) held in 1997
40. Distinction in Biochemistry (MBBS-Ist prof.) held in 1997
41. Dr. Abhijeet Malhotra memorial medal for standing first in aggregate in final prof. MBBS
42. Merit award for standing first in aggregate in final prof. MBBS
43. Rukmani Gopal Krishnan memorial medal for standing first in Surgery in MBBS held in 2000
44. Merit award for standing first in Surgery in MBBS held in 2000
45. Dr. S.K. Goel award for standing first in ENT in MBBS held in 2000
46. Merit award for standing first in ENT in MBBS held in 2000
47. K. Sridharan award for standing first in Ophthalmology in MBBS held in 2000
48. Merit award for standing first in Ophthalmology in MBBS held in 2000
49. Merit award for standing second in Pathology in MBBS held in 1999.
50. Merit award for standing second in aggregate in IInd MBBS held in 1999
51. Merit award for standing second in Anatomy in MBBS held in 1997

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52. Winner of college round of 13th IAP (Indian Academy of pediatrics) Pediatric Quiz 2000
53. Winner of Zonal round of 13th IAP (Indian Academy of pediatrics) Pediatric Quiz 2000
54. First runner-up in divisional round of 13th IAP (Indian Academy of pediatrics) Pediatric Quiz 2000
55. Winner of college round of 11th IAP (Indian Academy of pediatrics) Pediatric Quiz 1998
56. Winner in the Quarterfinals of the Glaxo welcome Medimind Talent search contest 2000
57. First runner-up in the Semifinals of the Glaxo welcome Medimind Talent search contest 2000
58. Winner of the Medical Quiz in RIPPLE 2001(Delhi intercollege festival of university college of medical sciences)

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