

Vietnam's Vinmec Healthcare System Performs Its First Total Femoral Replacement for World's Youngest Cancer Patient

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/EINPresswire.com/ -- [Vinmec Healthcare System](#) has successfully performed a Total Femoral Replacement (TFR) surgery using personalized 3D printing materials for the world's youngest cancer patient. It is also the first biomedical product designed and produced entirely in Vietnam, marking a major milestone in the country's advancement in precision medicine.

Refusing to Surrender to Fate

In October 2022, after a minor fall, Tran Minh Duc (a boy from Ho Chi Minh City) hurt his left thigh. Believing it to be just a simple injury, his family was shocked to hear the bad news from the doctor: The boy was diagnosed with osteosarcoma - a malignant bone cancer with a tumor that had invaded his entire femur. It is typically seen in adolescents, but rare and haphazard in younger children.

Given the severe prognosis, most medical facilities recommended amputation to ensure his survival or bone grafting (a conventional method). Both methods carry a high risk of rejection and infection, especially for younger children in the development stage. However, Ms. Xuan Hoang, Duc's mother, did not accept that fate. For nearly two years, she and her son visited different hospitals, regardless of large or small ones, to find a solution that keeps the entire leg of her son. During the period of



Vinmec successfully performs the world's youngest pediatric total femur replacement using 3D printing technology.



Post-surgery, the child has recovered well, is walking with the support of physical therapy, and shows no signs of infection or implant rejection.

Duc's chemotherapy, she carried him to school on her back every day, then spent her nights looking into medical literature and contacted domestic and foreign doctors.

She said: "Every day, my son would ask me: Will I ever walk again?" If I give up, I cannot give him an answer. My son deserves a proper childhood."

The flash of hope appeared when she met Prof. Dr. Tran Trung Dung - Director of the Orthopedic Council, Vinmec Healthcare System. An unprecedented approach was proposed to apply to such a young patient: replacing the entire femur with personalized 3D-printed materials that are produced in Vietnam.

A "Legendary" Surgery with Vietnamese Technologies

According to Prof. Dr. Tran Trung Dung, the entire femur of Duc has been invaded by the tumor. To ensure his life, Duc's leg had to be amputated. However, different types of artificial joints available on the market are not compatible with young bodies.

After various interdisciplinary case conferences including Orthopedics, Oncology, Diagnostic Imaging, Pathology, Clinical Pharmacy, etc., the Vinmec experts reached a consensus on the optimal approach - a two-phase surgery. Phase 1 (January 2024): Removing the tumor and temporarily grafting a cement bone. Phase 2 (May 2025): Replacing the entire femur with a "customized" bone made of 3D-printed metal.

On January 29, 2024, Duc underwent his first surgery - removing the entire tumor and temporarily grafting a cement bone. In May 2025 when his conditions had stabilized, Duc's entire femur was replaced with a "customized" bone made of 3D-printed metal. For the first time, 3D printing was applied to the youngest patient in the world with the collaboration between Vinmec medical professionals and VinUni's engineers. The bone's design is modular, enabling future extensions based on the child's physical development.

According to MSc. Dr. Tran Duc Thanh, who was directly engaged in the surgery: "We contacted foreign manufacturers but there was no suitable design. Self-manufacturing the equipment allows us to be proactive in treatment, it also paves the way for a new direction for Vietnamese medicine."

Prof. Dr. Tran Trung Dung added: "The 4-hour surgery was a success. Duc recovered quickly without any complications, now he is able to walk with the support of physical therapy. The surgery represented a breakthrough in complex techniques and the evidence for sound collaboration in the multidisciplinary medical team. Both the life and limb of the child were kept intact."

Vinmec - Pioneering in Vietnam's Personalized Precision Medicine

Once at risk of amputation and life-long dependence, Minh Duc is now able to walk on his own feet, supported by physical therapy without any complications of infection or transplant rejection. Every step Duc takes is a testament to precision medicine, advanced technologies, and the unwavering love of his mother.

“When my son stood up, I was trembling with joy. He has been unable to walk for nearly two years. Now he did it. I just hope that he will be capable of riding a bike and playing football like his peers...” - Ms. Hoang said in tears.

Prof. Dr. Tran Trung Dung also shared his emotions: “We believe that modern medicine and compassion should go side by side. Duc is not just a special patient, his case represents a story of determination, maternal love, and the faith that the impossible can become possible if we never give up.”

Vinmec is the first Vietnamese healthcare system that applies personalized 3D printing in the treatment of musculoskeletal conditions. Instead of using standardized equipment, Vinmec uses CT and MRI data in the design of artificial joints and bones tailored to each patient to optimize motor functions, enhance precision, and reduce the recovery period.

To date, Vinmec has achieved successes in many difficult and rare cases, e.g. liver transplantation for an 8-month-old patient from a brain-dead donor, the first in Southeast Asia to reproduce 3D-printed titanium chest wall, and the first in the world to replace the pelvis and femur at the same time with 3D-printed bones.

With a series of breakthroughs in high-tech healthcare and precision medicine, Vinmec is reinforcing its commitment to advancing Vietnam’s standing in the global medical arena. Positioned as both a center for healing and a catalyst for innovation, Vinmec is reimagining the future of medicine.

About Vinmec Healthcare System

Vinmec is Vietnam’s leading private healthcare system, with a network of 9 hospitals nationwide, developed to international standards with a focus on comprehensive, personalized, and specialty care. Its proud achievements include:

- A strategic partnership with Cleveland Clinic, one of the world’s top healthcare systems, enabling global clinical collaboration and access to world-class medical standards.
- No.1 Healthcare Services for Foreigners in Vietnam, trusted by international residents for its high-quality care, globally trained physicians, and international-standard facilities.
- The only healthcare system in Asia honored at the Healthcare Asia Awards 2025, receiving two prestigious accolades: Hospital Group of the Year and Technology Innovation of the Year, reinforcing its leadership in the region.
- JCI-accredited, meeting the world’s most rigorous standards for patient safety and healthcare

quality.

- The first and only healthcare system in Vietnam to establish Centers of Excellence (CoEs) across four key specialties: Cardiology, Oncology, Orthopedics & Sports Medicine, and Clinical Immunology – Allergy.

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