Japanese Technology Revolutionizes Microsurgery

World's Thinnest Needles Contribute to a Better Quality of Postoperative Life

Medical treatment is among the fields in which superior Japanese technology has won international recognition. And in quite a few cases the companies that provide this technology are small or medium-sized enterprises. This article introduces one such company.

Japan is the source of the world's thinnest surgical needles. These have made it possible to perform operations that require the suturing of tiny tissues and blood vessels, such as the transplanting of a thin layer of skin without excision of the muscle underneath or the reattachment of an infant's severed finger. They have a diameter of only 0.03 millimeters (about a thousandth of an inch) and are just 0.8 mm long. The thread they pull is so fine, with a diameter of 0.012 mm, that it is invisible to the naked eye. The company that developed these revolutionary medical implements is Kono Seisakusho Co., Ltd., which is headquartered in Ichikawa, Chiba Prefecture, and has about 150 employees.

This 0.03 mm needle was first produced in 2004 after three years of development. Previously a diameter of 0.1 mm was standard for the needles used in microsurgery (surgery conducted using microscopes). Most surgeons felt no need for thinner needles, and manufacturers did not have the technological capability to produce them. But advances in medical techniques gave rise to demand for ultra-thin needles, and Junichi Kono, president of Kono Seisakusho, undertook to meet this demand.

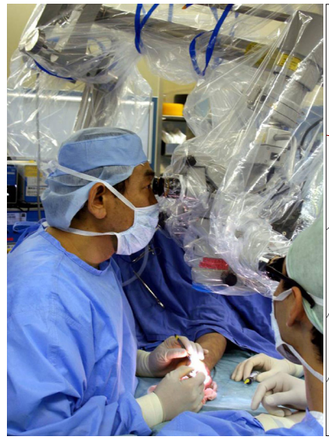
The development process turned out to be extremely difficult. With such a small diameter, a needle, even if it is made of metal, is as limp as cotton fiber. The needles need to be cut, polished, and finished by hand while being viewed through a microscope. Kono's firm had to develop its own special tools and machinery for the process. Also, it is not possible to drill a hole for thread in such a thin needle, and using a laser beam melts the metal. After repeated failures, the developers finally came up with a solution inspired by a traditional technique: split the base of the needle in two and squeeze the thread between the prongs.

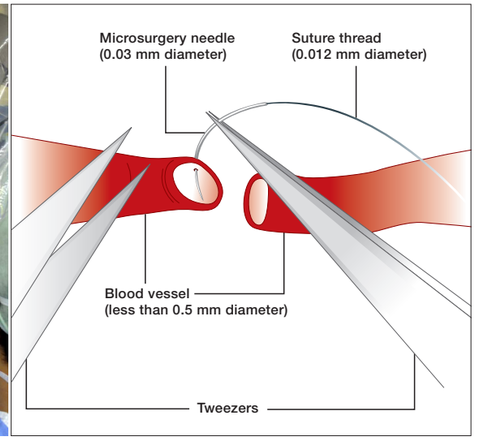
The commercial production of 0.03 mm needles revolutionized multiple types of medical procedures, including regenerative surgery and transplant operations. By allowing surgeons to suture blood vessels, lymph vessels, nerves, and other tissues less than 0.5 mm thick—a level of precision that was previously considered impossible—these needles have lessened the physical stress of patients and contributed to a better quality of postoperative life.

Kono Seisakusho's lineup includes about 10,000 types of needles, which it supplies to hospitals around the country. President Kono says the company's distinctive strength lies in its ability to turn out many different types of products in small lots. The company also produces many of the manufacturing devices that it uses to make this flexibility possible. Women make up the majority of the employees sustaining the company's precision crafting operations. Many commute to work by bicycle after dropping their children off at nurseries or kindergartens. Employees praise the workplace environment and say that they enjoy working there.

Kono's firm often receives visitors from other Asian countries, such as Thailand, Viet Nam, and China, and it is hoping to expand its international presence. Kono declares, "We will continue to focus on quality and on skilled manufacturing, turning out products with pride."

Kono Seisakusho official website
http://www.konoseisakusho.jp/en/index.html





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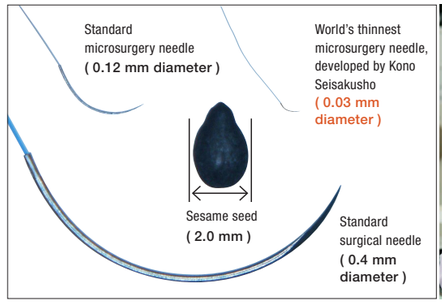
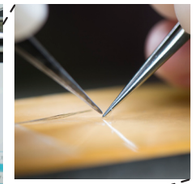
1. A surgeon performs an operation using an ultra-thin needle and thread while looking through a microscope. (Photo courtesy of Professor Isao Koshima, University of Tokyo.) 2. Suturing blood vessels using a microsurgery needle and thread.





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3. A standard surgical needle (bottom) and microsurgery needles from Kono Seisakusho. The tiny size of the latter is evident. 4. Threading a microsurgery needle, barely visible to the naked eye, using a microscope and tweezers. Women are active in many of Kono Seisakusho's operations, including this kind of precision work.

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5. Junichi Kono, president of Kono Seisakusho, says the company focuses on products with high added value and aims to play a broad role in the medical field around the world. 6. The world's thinnest surgical needles are produced in the main plant of Kono Seisakusho, located in a residential district of Ichikawa, Chiba Prefecture.