



Evolution of Microsurgery

Plastic and reconstructive surgery is a surgical speciality that aims to restore or improve the form and function of body parts affected by illness, trauma or congenital disease. Microsurgery describes surgical procedures performed using a microscope and specialised tools. It is often used to connect small structures in the body such as blood vessels and nerves. Advances in microsurgical tools and techniques have paved the way for a wide variety of highly successful modern surgeries.



Origin

In the absence of the ability to close a wound directly, or to use a skin graft, a flap must be used. While a skin graft can regrow blood vessels to spontaneously restore blood flow, a flap is too thick and requires surgical intervention to stay ‘alive’.

In the 1900s flaps were mainly used from skin immediately adjacent to the surgical site. Transferring a flap from a distance was a complex and unreliable process requiring multiple staged transfers and taking several months.



Investment

The Microsurgery Research Centre (later the O’Brien Institute) was set up in the grounds of St Vincent’s hospital and pursued targeted, boutique research into microvascular surgery.

From its beginning, its founder Dr O’Brien and other key researchers were supported with almost continuous funding from NHMRC Project Grants. Young surgeons from multiple disciplines flocked from around the world to Melbourne to be part of what was an epicentre of Microsurgery.



Research

O’Brien and his team developed specialised microvascular clamps and miniature tools for reconnecting nerves and suturing small blood vessels. Once the team had mastered suturing vessels as small as 1mm, they experimented with detaching tissue from its blood supply and reattaching it to the local blood vessels of another region, a ‘free flap’ transfer. In 1973, researchers at the Institute performed the first successful one-stage free microvascular tissue transfer in a clinical setting.



Translation

Being one of the earliest groups in the world to adopt the principles of microsurgery, the clinical cases at the Institute were novel and spectacular and attracted wide public attention. Many of the research projects at the Institute led directly to clinical applications including in ischemia reperfusion, nerve regeneration, tissue prefabrication, tissue engineering and microsurgical surgical procedures including ring finger transfer, thumb reconstruction, vascularised tendon grafts, salivary gland transfer and breast reconstruction.

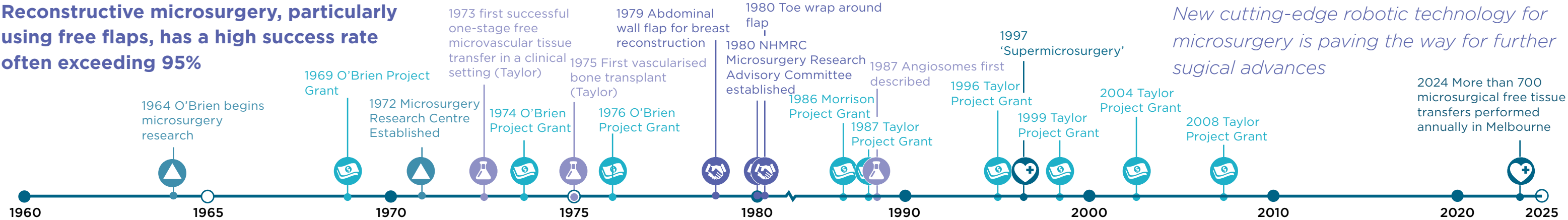


Impact

The development of free flap transfer and the introduction of the angiosome concept marked a new era in surgical precision and efficacy. These innovations allowed surgeons to perform complex operations that drastically reduced the need for amputations and improved functional outcomes for patients with trauma and cancer in all areas of the body. Today, microvascular free tissue transfer remains an indispensable technique in plastic and reconstructive surgery.

Reconstructive microsurgery, particularly using free flaps, has a high success rate often exceeding 95%

New cutting-edge robotic technology for microsurgery is paving the way for further surgical advances



Researchers

Dr Bernard O’Brien AC CMG
Prof G Ian Taylor AO
Prof Wayne Morrison AM

Dr Richard Hamilton
Dr Ingemar Fogdestam
A/Prof Geradine Mitchell
Prof Alastair Stewart

Prof Rik Thompson
Prof Michael Hickey
Prof Greg Dusting
Prof Alice Pebay

Prof Yoshi Tanaka
A/Prof Ramin Shayan

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