

# Holding his nerve

Meet Jack, who thanks to revolutionary surgery is regaining his independence one nerve at a time.

By 7.30's Rachael Brown, photography by Margaret Burin

Jack Vawdrey is trying to put his tracksuit pants on.

What follows are tediously clumsy clutches at the material with his clawed fists. Trying to get them over his feet, then his catheter, then infuriating minutes as he tries to unhook his left foot from over his right foot, where it was positioned for Jack to

second nature.

Through it all, Jack takes exhausted breaths, and his stare suggests he's futilely willing on muscles that his brain can no longer talk to.

This communication breakdown is thanks to a drunken dive in late 2014 that left him a quadriplegic. But there's not one eye-roll, swear word nor moment of surrender.

It takes Jack 16 agonising minutes. This is progress, it used to take an hour.

It's this steely determination that makes Jack a prime candidate for pioneering nerve transfer surgery, which promises to restore some of his independence. And it's this grace that sees him face the daily struggle of lost independence, lost privacy, and the ever present question of what could have been.

Jack's mum Julie is inimitable. She has a wicked sense of humour, and a stubbornness that's both Jack's bane and life-buoy. Exactly the kind of woman you want in your corner, in a rough spot. She refuses to look back. "What's the point?", she says. Wasted energy.

Instead she nudges her son through his new baby steps. And she agrees to having an ABC shadow for a year, not for Jack, his fate is largely sealed, but in the hope it will make others think twice about risk-taking.



## A fateful leap

drunk, into a male's pool, hitting his head and fracturing his C5 vertebrae.

"I thought I was coming towards the surface, but I was obviously heading towards the ground, I hit my head, couldn't move my arms, then I blacked out from there."

Jack died. Friends jumped in, dragged him out, gave him mouth-to-mouth and kept him warm by a heater until paramedics arrived.

It was a leap that would cost him dearly.





Now, everything is glacial, bar the flip-book of memories. He laments, "I can never kick a footy with my mates again. Never play with my mates again. Play in a grand final. All that I miss. Little things. Having a beer with my mates." But Jack's acutely aware life turns on a dime, and in so many ways, he's lucky. "I think of all the far more stupid things I've done, all the other times it could've happened to me, and this time it did. It's just unlucky I guess."

Does he wish he wasn't here?

"Not to the extent that I wish I wasn't revived, I'm happy to be here. I suppose the nerve surgery gives me another chance for independence, so I can move forward. Hopefully it lessens the load."









**Warning: Surgical imagery that may be confronting**

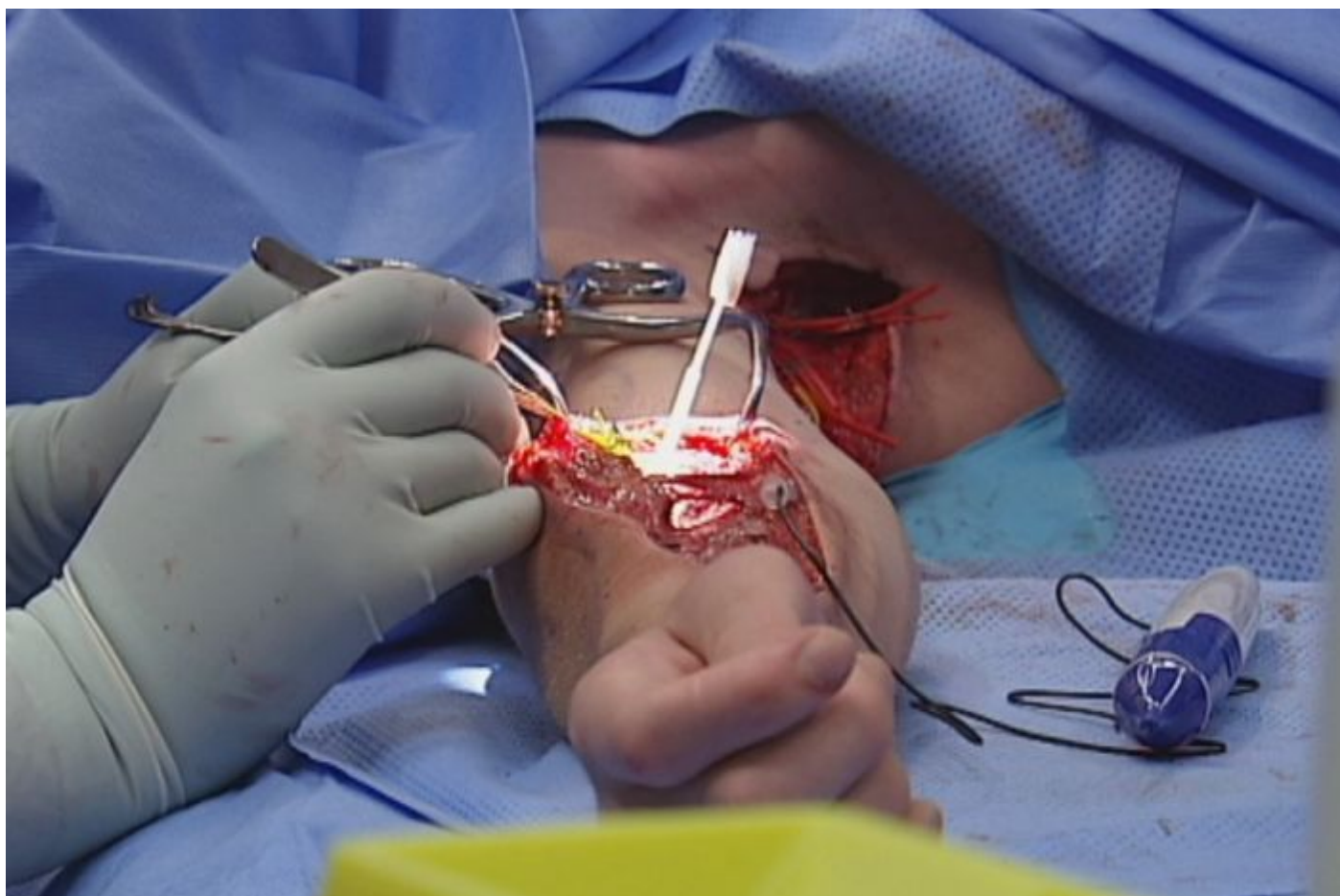
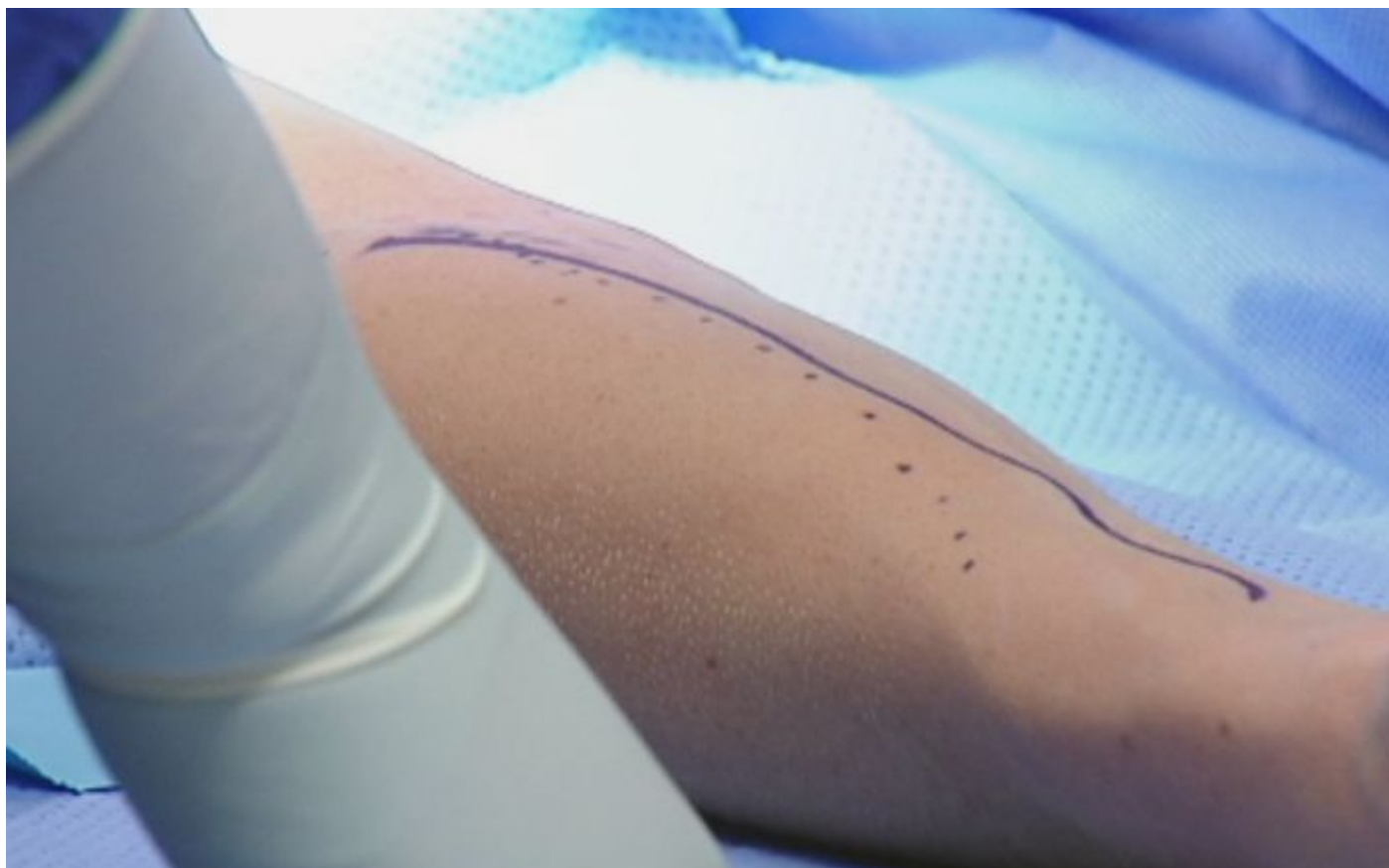
It's the day of the surgery. Music spills out from a laptop, the surgical team catch up, it's just another day in the office. But when they clock off after this eight-hour slog, Jack will be on the road to regaining the use of his arms.

Austin Health surgeon, Natasha Van Zyl, holds a pen-like device that emits a small electrical current and tells me she's testing for the target nerve, the one she'll plug another nerve into. As she touches a point on Jack's wrist, his fingers immediately splay, taut, like something out of *The Terminator*.

Jack's out to the world, but this electrical current animates his fingers because the nerve circuitry between these muscles and his spinal cord, is below Jack's C5 injury, so his reflex arc is intact. It's just that when he's awake, he can't send messages from his brain through his spinal cord. So just as the device can bypass Jack's brain, the surgery will take nerves innervated above the level of the injury and plug them into muscles below the injury.

There'll be two nerve transfers in each arm. The supinator nerve, which usually twists your palm from face down to face up, will be plugged into one that will now open Jack's hand. Next, a shoulder external rotator nerve, what you would use to put up your hand to make a stop sign, will be diverted into his tricep, to facilitate elbow extension. The donor nerves are surplus, spare ones if you like, so the patient does not lose function in having them transferred. Finally, there'll also be a tendon transfer on each thumb to help Jack's grip.











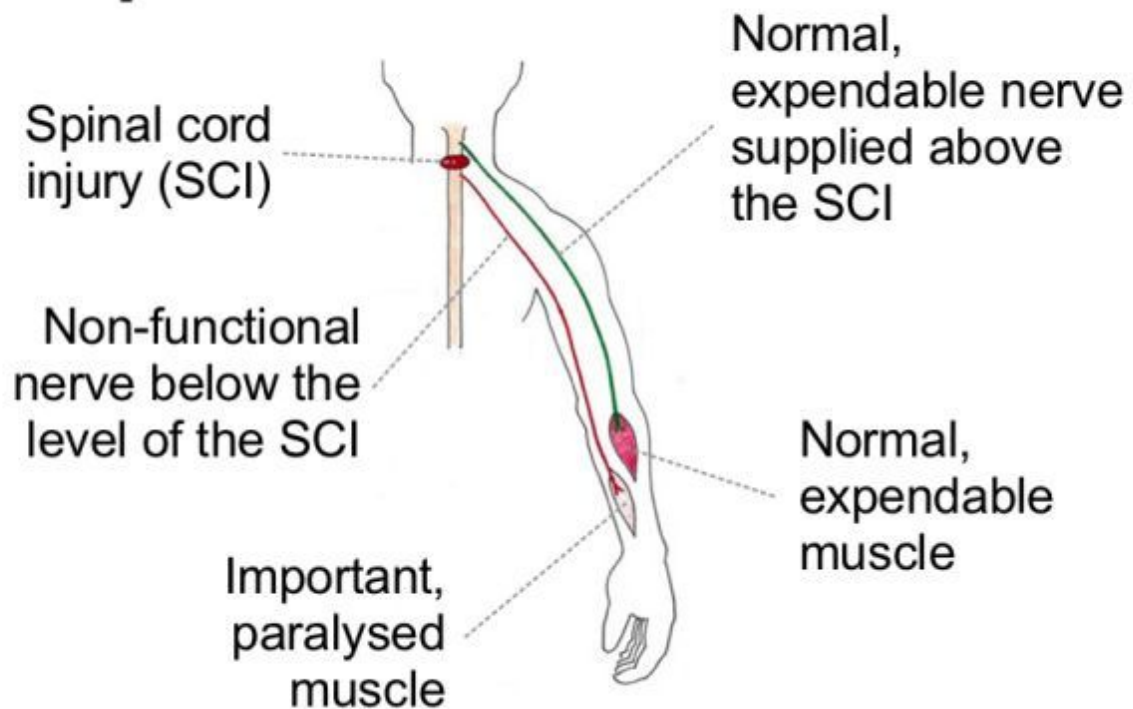
The advent of this triple move transfer has been ground breaking.

The Director of the Victorian Spinal Cord Service at Austin Health, Dr Andrew Nunn, explains; "patients with complete quadriplegia don't, as yet, have a safe and realistic cure, as was hoped, with stem cells." So through the 90s, the Austin was performing tendon transfers, to optimise upper limb function.

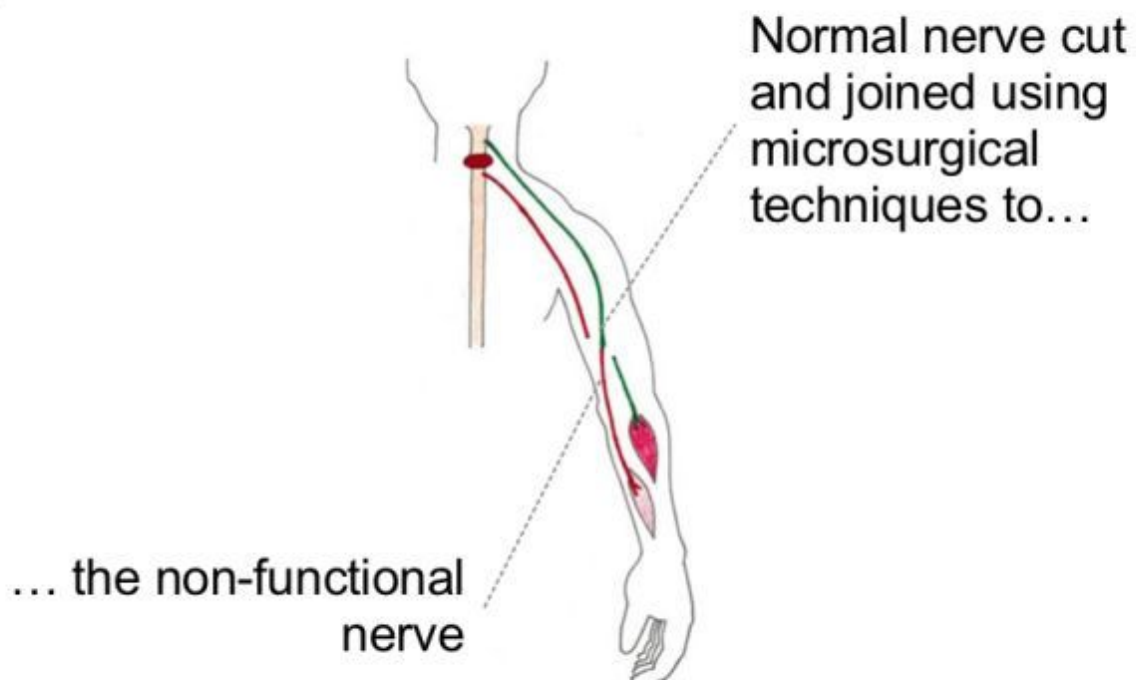
But now for the first time multiple nerve transfers can restore much more function.

"Amazingly, once the brain has a connection through the new donor nerve to the hand, it then learns and can separate out the original and transferred nerve functions. After spinal cord injury, the brain shifts the area of cortex driving the hand, presumably to the face. Remarkably this seems to shift back as the hand is re-innervated. This neural plasticity is being researched using functional MRI."

# Pre Operation

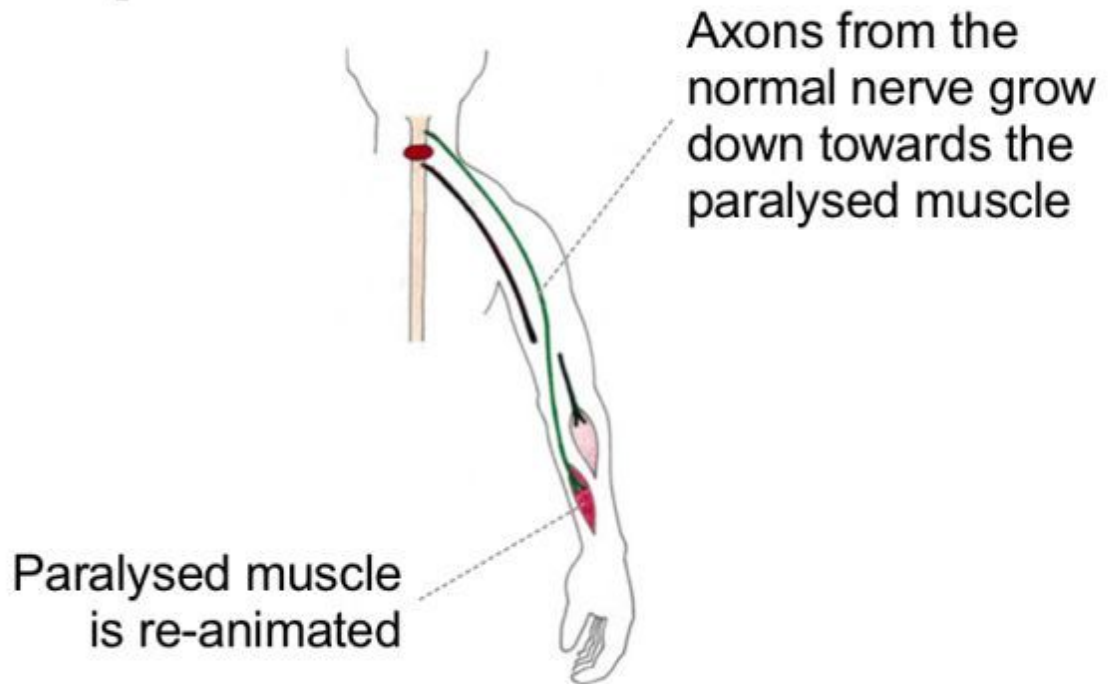


# Operation





## Post Operation



## Vital function

Quadriplegics rate hand function above all else. Above normal bladder function, normal sexual function, even above being able to walk. "It makes a huge difference to their lives, very small things that we take for granted," says surgeon Michael Weymouth, "pushing the bed sheets off, grabbing something and moving it."

So this operation can make a world of difference, and this unit is a world leader in nerve transfer surgery. Since 2012, the hospital's performed 107 nerve transplants, in 32 patients.

While this type of procedure can give patients like Jack far greater function and independence, it's unlikely to get him to walk again .

"You can do nerve transfers in the leg if you've got nerves in the leg that are working and that are expendable. But when the whole leg is paralysed and your closest nerves to the leg are high up in the arm, it's a very long way for nerves to have to travel," surgeon Natasha Van Zyl explains.

six centimetres don't have very good outcomes. We would need better technology to get the nerve to the leg in terms of the length of graft and we'd need to be able to preserve the muscle long enough for those nerves to reach."

The operation is eight hours of nervous tension. Separating nerves with plastic slings to aid precision, testing potential donors, then the meticulous handiwork, stitching the donor nerves to the target ones.

When they stitch Jack up, Natasha Van Zyl carefully washes some blood from his forearm, in a familiar motherly fashion. She has two sons herself.

## One millimetre per day

A large chunk of the years when his mates are starting uni, getting drunk, picking up chicks, maybe working part-time and playing amateur footy, Jack's home will be the Royal Talbot. For a kid who started running when he was ten months old, now his life is all about patience. Nerves regenerate about 1 millimetre a day with a little bit of a time lag at the beginning, before they start marching down the axons back to the muscle, so it's a slow process.

"It'll take at least three months for a flicker of movement in his hand opening, and between four to six months to see a flicker of movement, not full strength, in his tricep", Michael Weymouth explains.

Jack fills his days watching TV – he's glued to the NBA at the moment, cheering on Oklahoma City – and doing rehab sessions. In between is a lot of leaning on carers and family; to get him up and dressed in the morning, look after his personal care, to feed him and keep his spirits up. Lucky for him he's got a family whose medicine is black humour.

