

# Bionic Arm

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19. Past Tense Verb
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26. Verb Ending In Ing
27. Past Tense Verb
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60. Past Tense Verb

# Bionic Arm

As the first \_\_\_\_\_injured in \_\_\_\_\_to use a new \_\_\_\_\_  
\_\_\_\_\_ Cpl Andrew Garthwaite's story has already been remarkable.

But this week he \_\_\_\_\_six hours of surgery at a hospital in Austria at the start of a process to  
make it even more so - to prepare him to be fitted with an \_\_\_\_\_he will be able to control with his  
\_\_\_\_\_.

The 24-year-old, from South Tyneside, was \_\_\_\_\_in Helmand, Afghanistan, in  
September 2010 when a Taliban rocket-propelled \_\_\_\_\_took off his right \_\_\_\_\_and  
\_\_\_\_\_one of his \_\_\_\_\_.

He first had to learn how to \_\_\_\_\_everyday \_\_\_\_\_with one \_\_\_\_\_but was  
\_\_\_\_\_to

learn he would have one of the latest models of \_\_\_\_\_fitted.

He could \_\_\_\_\_a \_\_\_\_\_and do basic \_\_\_\_\_. He could also \_\_\_\_\_his party trick

- \_\_\_\_\_his hand 360 degrees.

A technician then \_\_\_\_\_a new arm so he could ride his motorbike.

\_\_\_\_\_

He \_\_\_\_\_it all with a positive attitude and said his \_\_\_\_\_was \_\_\_\_\_by the

support he had from his \_\_\_\_\_ his \_\_\_\_\_and \_\_\_\_\_who saved his \_\_\_\_\_.

This

\_\_\_\_\_ though, has its \_\_\_\_\_ and Cpl Garthwaite needs to \_\_\_\_\_ his  
\_\_\_\_\_ or \_\_\_\_\_ muscle to achieve a single, \_\_\_\_\_.

Cpl Garthwaite was badly \_\_\_\_\_ in September 2010

He was then \_\_\_\_\_ eligible for some \_\_\_\_\_. It involved \_\_\_\_\_  
\_\_\_\_\_ to \_\_\_\_\_ to have what the medics there called \_\_\_\_\_

Reinnervation (TMR), the first step on the process to receiving the \_\_\_\_\_ he will control with his  
\_\_\_\_\_.

\_\_\_\_\_ before he \_\_\_\_\_ he said: "I'm really excited at going over. A little bit  
\_\_\_\_\_ but I think the outcome is going to be great.";

The surgeons at the hospital in the Medical University of Vienna have rewired his nervous system.

He is \_\_\_\_\_<sup>Past tense verb</sup>\_\_\_\_\_ to be the first person from the UK to undergo this cutting-edge technique in the field of bionics.

Cpl Garthwaite said he had been "lost for words"; when he learnt that and was "honoured"; to have been chosen.

'Difficult surgery';

Surgeons at the hospital are working closely with bionics company Otto Bock, in Vienna, to create one of the most intelligent bionic systems in the world.

In an operation lasting six hours on Tuesday surgeon Prof Oskar Aszmann and his team \_\_\_\_\_<sup>Past tense verb</sup> out which of the mass of tiny nerves from his shoulder joint operated his arm and hand. Once they isolated those, they rewired them into his chest.

After the surgery, Prof Aszmann said: "It all went extremely well.

"It was a surprise to me because he had a shrapnel injury, there was a rocket wound, so normally you have to expect a lot of scar tissue, but it was not the case.

"It was a difficult surgery, but we could identify all the nerves that we wanted to and transfer them to the appropriate targets.";



In the coming months these nerves will grow. Cpl Garthwaite's mind will work out which nerves do what, and will learn how to control those nerves.

He will then be able to control his bionic arm in such a way that it will become intuitive, unlike the slow robotic movements of his current arm.

Prof Aszmann said the surgery went "extremely well";

He will be able to think several moves and his arm and hand will react naturally. His bionic arm will be thought-controlled.

'Exciting

prospect';

After his complex, remarkable surgery, Cpl Garthwaite will soon feel a hand on his chest, his own hand.

And, as the nerve endings grow he too will be able to operate his bionic limb by simply thinking about those

hand and arm movements.

Prof Aszmann said: "For the first four to five months he will be very numb and not feel anything, but after around six months, he will feel his own index finger and thumb in his shoulder, so when he pinches his shoulder he will say 'oh this is my index finger or here's my thumb'.

"That's really exciting because, in the future we will have little senses in these artificial fingers and they will have direct sensory feedback.";

Before the surgery, Cpl Garthwaite said he was excited at the prospect of having a more natural arm movement and being able to use it quickly rather than the slow process it can be currently and even the possibility of being able to feel hot and cold.

He said: "I still have my down days and I still have flashbacks and memories, which will never leave us, but you just learn to crack on.

"With this new target I have got to hit now, it is keeping my mind occupied.

"You just want to look into the future and just think what's actually going to happen, how much it's going to benefit me.";

See more in Look North on BBC1 in the North East and Cumbria on Wednesday 25 January at 18:30.

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