

Free-functioning gracilis transfer to restore upper limb function in brachial plexus injury

HealthTech guidance
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Your responsibility

This guidance represents the view of NICE, arrived at after careful consideration of the evidence available. When exercising their judgement, healthcare professionals are expected to take this guidance fully into account, and specifically any special arrangements relating to the introduction of new interventional procedures. The guidance does not override the individual responsibility of healthcare professionals to make decisions appropriate to the circumstances of the individual patient, in consultation with the patient and/or guardian or carer.

All problems (adverse events) related to a medicine or medical device used for treatment or in a procedure should be reported to the Medicines and Healthcare products Regulatory Agency using the [Yellow Card Scheme](#).

Commissioners and/or providers have a responsibility to implement the guidance, in their local context, in light of their duties to have due regard to the need to eliminate unlawful discrimination, advance equality of opportunity, and foster good relations. Nothing in this guidance should be interpreted in a way that would be inconsistent with compliance with those duties. Providers should ensure that governance structures are in place to review, authorise and monitor the introduction of new devices and procedures.

Commissioners and providers have a responsibility to promote an environmentally sustainable health and care system and should [assess and reduce the environmental impact of implementing NICE recommendations wherever possible](#).

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This guidance replaces IPG687.

1 Recommendations

- 1.1 Evidence on the safety of free-functioning gracilis transfer to restore upper limb function in brachial plexus injury shows well-recognised complications. Evidence on its efficacy is adequate to support the use of this procedure provided that standard arrangements are in place for clinical governance, consent and audit. [Find out what standard arrangements mean on the NICE website.](#)
- 1.2 This procedure should only be done in a specialist brachial plexus unit by a multidisciplinary team including specialised physiotherapists, with input from microvascular surgeons.

2 The condition, current treatments and procedure

The condition

2.1 The brachial plexus is a network of nerves that carries signals from the spinal cord to the shoulder, arm and hand. These nerves can be damaged by being stretched, compressed or torn from the spinal cord. The most severe brachial plexus injuries are often a result of road traffic accidents. Severe nerve damage can lead to paralysis of an upper limb, with a loss of function and sensation, and severe pain.

Current treatments

2.2 Treatment depends on the type and severity of the injury, and the length of time since the injury. Injuries of the upper brachial plexus roots affect the muscles around the shoulder. Injuries of the lower roots affect the hand. Many injuries affect both upper and lower roots. Current treatments include medicines to treat pain and conservative care (such as physiotherapy). For some people, surgical procedures are needed to restore function. These include direct suture, nerve grafts, nerve transfer, tendon transfer and free-functioning muscle transfer.

The procedure

2.3 This procedure aims to restore the function of the upper limb after brachial plexus injury, improving the patient's ability to carry out daily activities.

2.4 The procedure is done under general anaesthesia, with the patient in a supine position. A functioning gracilis muscle, with its own nerve and blood supply, is dissected from the inner thigh. The gracilis muscle is then transferred and joined to the prepared recipient site of the upper limb. The gracilis muscle's nerve is

connected to a functioning nerve in the arm. The transfer is usually to 1 muscle group but transfer to different sites, such as the biceps or the finger flexors, may be needed depending on the nerve injury. The aim is usually to reconstruct a single function, such as elbow flexion.

2.5 After the procedure, the patient needs to wear a cast or splint for about 6 weeks to immobilise the elbow and protect the transferred gracilis muscle. Long-term physiotherapy is needed after the procedure so that the patient can learn to control the transferred muscle.

3 Committee considerations

The evidence

- 3.1 NICE did a rapid review of the published literature on the efficacy and safety of this procedure. This comprised a comprehensive literature search and detailed review of the evidence from 10 sources, which was discussed by the committee. The evidence included 2 systematic reviews, 4 non-randomised comparative studies and 4 case series. It is presented in table 2 of the overview. Other relevant literature is in the appendix of the overview.
- 3.2 The professional experts and the committee considered the key efficacy outcomes to be: restoring upper limb function and improving quality of life.
- 3.3 The professional experts and the committee considered the key safety outcomes to be: pain, bleeding, infection and graft failure.
- 3.4 Patient commentary was sought but none was received.

Committee comments

- 3.5 The committee noted that this procedure can be done as a single or double free-functioning gracilis transfer. The evidence suggests a double transfer may be more effective than a single transfer.
- 3.6 The committee noted that postoperative physiotherapy is essential for functional recovery and relearning neurological muscle control. Long-term supervision from physiotherapists is needed and the patient must be completely engaged with their therapy.
- 3.7 The committee was informed that after the procedure it takes about 4 months for nerve reconnection and up to 1 year for muscle movement.

- 3.8 The committee noted that severe brachial plexus injury can have considerable adverse effects on a person's ability to carry out daily activities and their quality of life.
- 3.9 The committee noted that the procedure can be done as a part of primary treatment for total brachial plexus paralysis, or as a salvage treatment when reinnervation of existing muscles has failed to restore function in the upper limb.

Update information

Minor changes since publication

January 2026: Interventional procedures guidance 687 has been migrated to HealthTech guidance 568. The recommendations and accompanying content remain unchanged.

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Endorsing organisation

This guidance has been endorsed by Healthcare Improvement Scotland.