Clinical Commissioning Policy: Selective Dorsal Rhizotomy (SDR)
December 2012
Reference: NHSCB/E9/a
Clinical Commissioning Policy: Selective Dorsal Rhizotomy (SDR) For Children With Spasticity Secondary To Cerebral Palsy

First published: December 2012

Prepared by the NHS Commissioning Board Clinical Reference Group for Specialised Paediatric Neuroscience

© Crown copyright 2012
First published December 2012
Published by the NHS Commissioning Board, in electronic format only.
# Contents

Policy Statement ................................................................................................................................. 4
Equality Statement ................................................................................................................................. 4
Plain Language Summary ....................................................................................................................... 4
1. Introduction ........................................................................................................................................... 5
2. Definitions ............................................................................................................................................. 5
3. Aim and objectives ............................................................................................................................... 7
4. Criteria for commissioning ................................................................................................................... 7
5. Patient pathway .................................................................................................................................... 7
6. Governance arrangements .................................................................................................................. 8
7. Epidemiology and needs assessment .................................................................................................... 8
8. Evidence base ....................................................................................................................................... 9
9. Rationale behind the policy statement .................................................................................................. 9
10. Mechanism for funding ..................................................................................................................... 10
11. Audit requirements ........................................................................................................................... 10
12. Documents which have informed this policy ..................................................................................... 10
13. Links to other policies ....................................................................................................................... 11
14. Date of review ..................................................................................................................................... 11
References ............................................................................................................................................... 11
**Policy Statement**

The NHS Commissioning Board (NHS CB) will commission selective dorsal rhizotomy (SDR) for children with spasticity secondary to cerebral palsy, in accordance with the criteria outlined in this document.

In creating this policy the NHS CB has reviewed this clinical condition and the options for its treatment. It has considered the place of this treatment in current clinical practice, whether scientific research has shown the treatment to be of benefit to patients, (including how any benefit is balanced against possible risks) and whether its use represents the best use of NHS resources.

This policy document outlines the arrangements for funding of this treatment for the population in England.

**Equality Statement**

The NHS Commissioning Board (NHS CB) is committed to ensuring equality of access and non-discrimination, irrespective of age, disability, gender reassignment, marriage and civil partnership, pregnancy and maternity, race, religion or belief, sex (gender) or sexual orientation.

In carrying out its functions, the NHS CB will have due regard to the different needs of different protected equality groups. This applies to all the activities for which they are responsible, including policy development, review and implementation.

**Plain Language Summary**

Cerebral palsy (CP) describes a group of permanent brain disorders originating during foetal development, birth or early childhood. It is associated with abnormalities of movement, balance and posture. A particular feature is spasticity, or abnormally increased resistance to imposed movement about a joint.

Selective dorsal rhizotomy (SDR) is an irreversible division of some of the sensory nerves in the spinal cord, performed under general anaesthesia, which aims to reduce spasticity by decreasing sensory stimulation whilst preserving voluntary movement. Patients usually receive intensive physiotherapy for several months after SDR.

The Clinical Reference Group (CRG) is agreed that SDR provides significant clinical benefit to some children with cerebral palsy and has the potential to reduce their long-term care requirements and cost. In accordance with NICE recommendations SDR should be considered mainly for patients with cerebral palsy who are aged 3-9 years and who have the degree of spasticity outlined on this policy.

Information on the outcome of treatments for these patients will be collected and considered when this policy is reviewed.
1. Introduction

Cerebral palsy (CP) describes a group of permanent brain disorders originating during foetal development, birth or early childhood. It is associated with abnormalities of movement, balance and posture.

Selective dorsal rhizotomy (SDR) is an irreversible division of some of the sensory nerves in the dorsal lumbar spinal cord, performed under general anaesthesia, which aims to reduce spasticity by decreasing sensory stimulation whilst preserving voluntary movement. Patients usually receive intensive physiotherapy for several months after SDR.

NICE Clinical Guideline 145 recommends that SDR can be considered to improve walking ability in children and young people with spasticity at Gross Motor Function Classification System (GMFCS) level II or III.

The incidence of cerebral palsy (based on international estimates) is between 150 and 250 per 100,000 live births per year, with about 15% having spastic diplegia and a GMFCS level of II or III. This would equate to between 155 to 258 cases of cerebral palsy with spastic diplegia and a GMFCS level of II or III who might be considered for SDR in England per year.

A number of other interventions may be used to treat patients with cerebral palsy and spasticity. Some, such as orthotics or orthopaedic surgery aim to improve mobility at joints or reduce the risk of subsequent anatomical deformities resulting from long-standing spasticity. Others aim to reduce spasticity itself e.g. oral or intrathecal medication. It is usual for patients to receive a number of interventions tailored to their individual requirements and their ability to comply with treatment.

2. Definitions

Cerebral palsy (CP) describes a group of permanent brain disorders originating during foetal development, birth or early childhood. It is associated with abnormalities of movement, balance and posture. People with cerebral palsy can also have language and visual difficulties.

Muscle tone is normally determined by a sensory–motor reflex that takes input from sensory nerves in the muscles to the spinal cord and then stimulates spinal motor nerves to send contracting stimuli back to the muscles increasing muscular tone. This reflex is modulated (mainly down-regulated) by nuclei in the brain. It is this down-regulation that is impaired in people with cerebral palsy. Without sufficient down-regulation, the spinal sensory-motor reflexes act to increase muscle tone leading to spasticity.

Spasticity is a form of hypertonia (an abnormally increased resistance to imposed movement about a joint). Spasticity is characterised by one or both of the following:

- Resistance to externally imposed movement which increases with increasing
speed of stretch and varies with the direction of joint movement.

- Resistance to externally imposed movement which increases rapidly beyond a threshold speed or joint angle.

Lower limb spasticity affects 80% of people with cerebral palsy, and can impair walking and sitting, and cause discomfort, cramps and spasms.

**Spastic diplegia.** Traditionally, motor impairment associated with cerebral palsy has been classified by the region of the body involved. The term spastic diplegia used in many research studies describes a situation where the lower limbs are affected but the upper limbs are either less severely affected or unaffected.

**SCPE classification.** A new system suggested by the Surveillance of Cerebral Palsy in Europe (SCPE) network describes the most severely affected limbs according to whether there is symmetrical or asymmetrical involvement. Using the SCPE classification tree, the term spastic bilateral would be used to describe persisting increased muscle tone in one or more limbs where both sides of the body were involved.

**Selective dorsal rhizotomy (SDR)** is a neurosurgical operation, performed under general anaesthesia which aims to improve gross motor function by reducing muscle spasticity. This is achieved by reducing the sensory stimulation that feeds into the spinal-reflex arcs by dividing some of the sensory nerves in the dorsal lumbar spinal cord. There are two approaches that may be used to access the nerve roots. A multilevel approach involves removing and replacing six to eight lumbar laminae and the less invasive single level approach between T12 and L1.

Intra-operative neurophysiological assessment is often used to identify the sensory nerve rootlets most responsible for the excess motor tone. Selected sensory rootlets are divided, preserving some sensory supply. The nerve roots to be cut are from the lumbar 1 (L1) level to sacral 2 (S2) level, although some surgeons will avoid cutting the S2 level roots to reduce the risk of incontinence. The motor nerves responsible for voluntary movements are preserved. SDR is irreversible and patients can experience adverse affects such as deterioration in walking ability or bladder function. Longer term complications can include spinal deformity and further surgery may be necessary.

Patients usually receive intensive physiotherapy for several months after undergoing SDR and may have to re-learn how to walk.

**Modified Ashworth Scale.** Measures spasticity and improvement in tone in response to passive stretching on a 5-point scale (1 = no increase in muscle tone, 2 = slight increase giving a catch when part is moved in flexion or extension, 3 = more marked increase in tone but only after part is easily flexed, 4 = considerable increase in tone, 5 = affected part(s) rigid in flexion or extension). The degree of response is measured by the assessing clinician.

**Gross Motor Function Classification System (GMFCS).** A five level classification system that describes the gross motor function of children with cerebral palsy on the basis of their self-initiated movement. Children at GMFCS level one can perform the same activities as their age-matched peers, although with some difficulties with speed, balance and co-ordination. Children at GMFCS level five have difficulty in achieving any voluntary control of movement. The GMFCS is intended to assess what children do in their daily lives, rather than just measuring their best levels of
performance. It represents a broad indicator of important change.

**Gross Motor Function Measure (GMFM)** evaluates the change in gross motor function in children with cerebral palsy. The current version (GMFM-66) has 66 items covering: lying, rolling, sitting, crawling, kneeling, standing, walking, running and jumping. Each item is scored on a 4-point scale and items are grouped into five dimensions. A higher score indicates better gross motor functioning. The GMFM-66 is particularly favoured for monitoring outcomes in research. A more extensive measure (GMFM-88) may be used in clinical assessments.

**Gross Motor Performance Measure (GMPM).** Used to evaluate quality of movement in children with cerebral palsy. Twenty items assess alignment, coordination, dissociated movement, stability and weight shift. Each item is scored on a 5-point scale.

**Pediatric Evaluation of Disability Inventory (PEDI)** measures self-care, mobility and social skills using scores obtained by a combination of parent interview and direct observation. Scores range from 0 to 100 with a higher score indicating greater independence and less reliance on the caregiver.

### 3. Aim and objectives

To outline the commissioning position of the NHS Commissioning Board in relation to Selective Dorsal Rhizotomy (SDR) for children with spasticity secondary to cerebral palsy. This is based on evidence for the clinical and cost effectiveness of SDR.

### 4. Criteria for commissioning

In accordance with NICE recommendations SDR should be considered mainly for the following patients with cerebral palsy:

- Children aged 3-9 years
- Spastic diplegia GMFCS level II or III

### 5. Patient pathway

**Local multidisciplinary team (MDT) / service**

Children with cerebral palsy and spasticity will initially be assessed by a local MDT/service which may be led by the treating Consultant Paediatrician, Paediatric
Neurodisability Consultant or Paediatric Neurologist. Potentially suitable children for SDR are then referred on to the nearest specialist spasticity MDT.

**Specialist MDT**

A specialist MDT will be supported by:

- Paediatric Neurosurgeon/ Orthopaedic surgeon with appropriate expertise
- Paediatric Neurologist/Neurodisability consultant with specific interest in spasticity
- Physiotherapist
- Gait analysis team
- Occupational therapist

The specialist MDT will assess the child for suitability for SDR.

The Specialist MDT must be able to provide a broad range of treatments for children with cerebral palsy (including botox injections, orthopaedic corrective procedures & Baclofen pumps), so that SDR remains as one of several options rather than the only treatment offered. Spinal cord monitoring must be available for the SDR procedure.

### 6. Governance arrangements

Governance arrangements will be determined by the Safe and Sustainable review of Paediatric Neurosciences.

### 7. Epidemiology and needs assessment

The incidence of cerebral palsy based on international estimates is between 150 and 250 per 100,000 live births per year.\(^6\) Around 80\% of people with cerebral palsy have lower limb spasticity.\(^1\)

NICE recommends that patients with a GMFCS level of II or III could be considered for SDR.\(^3\) A cohort study of 323 patients born with cerebral palsy in Victoria, Australia between 1990 and 1992 found that 15\% of these children had spastic diplegia and a GMFCS level of II or III.\(^6\)

Figures from the Office of National Statistics state that there were 687,007 live births in England in 2010. If the cerebral palsy incidence and percentage of patients with a GMFCS level of II or III in England is similar to that based on international estimates, this would equate to about 1,000 to 1,700 new cases of cerebral palsy per year in England, of whom 15\% (about 150 to 260) would have spastic diplegia and a GMFCS level of II or III. Whilst this provides a rough estimate of the number...
8. Evidence base

NICE considered SDR within their clinical guideline on spasticity in children and young people with non-progressive brain disorders. A NICE clinical guideline is a best practice recommendation without mandatory force. The CG145 recommendation for SDR is to:

*Consider selective dorsal rhizotomy to improve walking ability in children and young people with spasticity at Gross Motor Function Classification System (GMFCS) level II or III.*

NICE reviewed the use of SDR for spasticity in cerebral palsy and published interventional procedure guidance (IPG) in 2006, which was updated in 2010 (IPG 373). This guidance was from NICE’s Interventional Procedures Programme, and therefore takes into account safety and efficacy, but not cost-effectiveness. It does not constitute a recommendation that the treatment should be used, merely an indication of the circumstances in which it may be used. IPG 373 states that:

*Current evidence on selective dorsal rhizotomy for spasticity in cerebral palsy shows that there is a risk of serious but well-recognised complications. The evidence on efficacy is adequate. Therefore this procedure may be used provided that normal arrangements are in place for clinical governance and audit.*

An evidence review was conducted in support of this policy.

In summary, it found that:
- There is moderate quality evidence that SDR plus physiotherapy in children resulted in significant improvement in spasticity and gross motor function over 12 month follow-up.
- There is a small quantity of low quality evidence that suggest that improvements following SDR may persist up to three years (gait) and 20 yrs (range of movement) after surgery.
- Trials comparing SDR with other treatments are not of sufficiently high methodological quality to provide useful information.
- No cost-effectiveness evidence was identified.

9. Rationale behind the policy statement

The CRG is agreed that SDR provides significant clinical benefit to some children with cerebral palsy and has the potential to reduce their long-term care requirements and cost.
10. Mechanism for funding

To be confirmed

11. Audit requirements

The CRG recognised the importance of collecting long term outcome information following SDR; both of benefits and adverse effects.

Regular outcome assessments should be undertaken following SDR up to the age of 18 (at 2, 5, 10 and 18 yrs of age).

Outcome measures should include:

- Incidence of new neurological impairment
- Incidence of spinal deformity
- Quality of life and overall pain level
- Social inclusion and care requirements
- Assessment of disability - video gait analysis, tone (MAS), range of movement, GMFM
- Number of orthopaedic spasticity procedures / botox injections

12. Documents which have informed this policy


NICE. Selective dorsal rhizotomy for spasticity in cerebral palsy. Interventional procedure guidance (IPG) 373, December 2010

Solutions for Public Health (SPH), and Bazian. Selective dorsal rhizotomy for children with spasticity secondary to cerebral palsy. Evidence review Commissioned by the National Specialised Services Transition Team (NSSTT) in England. September 2012.
13. Links to other policies

The mechanism operated by the NHS CB for funding requests outside of the clinical criteria in this policy is yet to be finalised

14. Date of review

To be confirmed.

References


