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Professional practices and recommendations

Drug treatments for spasticity

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SOFCOT: French Society for Orthopaedic and Trauma Surgery
SFP: French Society of Paediatrics
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Key messages:

Spasticity often has a negative impact on motricity and the locomotor system but may not always be problematic and can even be useful in some cases. Not all spastic patients necessarily require treatment.
Spasticity must be analyzed as a symptom by using the same approach, regardless of the aetiology.
The medical context (notably influenced by the condition's aetiology) must then be taken into account as part of an overall treatment strategy.
Spasticity treatment must only be initiated after rigorous clinical analysis, in order to determine the condition's intensity, true consequences and distribution. This presupposes a good degree of knowledge and investigational rigour.
A list of personal objectives must be drawn up for each patient.
Treatment first necessitates identification of any aggravating factors or nociceptive stimuli (bed sores, urinary infection or lithiasis, etc.) with which the spasticity is sometimes tightly intermeshed.
The therapeutic strategy should encompass not only the drug treatments presented here but also physiotherapy, the use of orthoses and technical aids, self-rehabilitation and surgery.
Drug treatments include orally administered compounds (baclofen and tizanidine), botulinum toxin, intrathecal baclofen and the local application of alcohol or phenol. Choice of the first-line treatment (orally administered drugs or botulinum toxin) will depend on the localized or extended nature of spasticity and on the aetiology.

1. Introduction

The following AFSSAPS's guidelines have been produced by a working group of experts in the field of spasticity treatment. An exhaustive analysis of the literature was performed. Each article was discussed by the expert committee and then selected and classified according to the standard criteria recommended by France's Drug Authority (AFSSAPS). The result is the fruit of the critical review of these articles and, when literature data were insufficient, the expert committee's discussions.

Whatever its aetiology, spasticity usually has a negative impact on motricity and the locomotor system; this justifies treatment of the symptom itself (i.e. independently of the aetiological context) as a function of the patient's neurological disorders and any links between the latter.

Treating spasticity can only be envisaged after rigorous clinical analysis, in order to determine the condition's intensity, true consequences and distribution. This presupposes a good degree of knowledge and investigational rigour.

Evaluating the real impact of spasticity is essential. The measurement of spasticity in a patient at rest does not reflect the condition's impact during movement.

Spasticity is subject to variations due to a number of different factors; the main one is the patient's body position and activity because the condition predominantly affects weight-bearing muscles and thus becomes more intense in the standing position.

Only the most detailed possible analysis of the impact of spasticity in all its functional aspects enables the practitioner to decide on the appropriateness of a given treatment and to set reasonable patient objectives in terms of function, comfort, hygiene and pain relief.

Evaluation of spasticity is performed on two levels:

- the symptom itself: hypertonia is measured on the Ashworth scale (which is most frequently used) or the Tardieu scale (which is more appropriate); the spasms are measured on the Penn scale;
- the impact of the symptom:
  - joint amplitudes, as measured by goniometry,
  - pain on a visual analogue scale,
  - impairment noted during nursing on scales intended for caregivers or the patient him/herself (the Disability Assessment Scale, for example),
  - impairment of active movement on clinical scales (the Box and Block test, the Motor Activity Log or the Frenchay Arm Test to evaluate prehension; speed and distance tests to evaluate gait, for example) and using very useful instrumental analysis (notably kinematic analyses).

Generic personal independence scales (such as the Barthel Index and the Functional Independence Measure) are too general to enable measurement of the effects of treatments.

A list of personal objectives must be drawn up for each patient; these must be evaluable separately, after having untangled the various components of the motor disorder and having evaluated as accurately as possible their respective contributions to the functional impairment. The therapeutic strategy is based on this objective-driven approach. Not all spastic patients necessarily require treatment.

The examination must answer the following three questions:

- is spasticity problematic and, if so, in what respects? This is the key question;
- is spasticity the main cause of the disability or only one of the components? In the latter case, which components are involved? The likelihood of a successful treatment outcome depends on the answer to these questions;
- is the problematic spasticity limited to one muscle group or spread more widely? Again, choosing the right treatment depends on the answer.

This clinical analysis can be usefully supported by an instrumental analysis (notably kinematic analysis) and by the

application of neuromuscular blocks which enable (on a case-by-case basis) the diagnosis of muscle retraction or a movement analysis.

Moreover, treatment must also address potential aggravating causes (bed sores, urinary infection or lithiasis, etc.), with which the spasticity is sometimes tightly intermeshed; the so-called ''nociceptive triggering factors increases spasticity (even in anesthetized and paralysed zones) but treatment of the latter also sometimes help to treat the nociceptive stimulus (sores, pain, etc.).

These guidelines only cover drug treatments, although the latter should generally be considered as just one component of a therapeutic programme that combines (to a varying extent) physiotherapy (which remains the basic treatment for all spastic patients), ergotherapy, the use of an orthosis and technical aids, auto-rehabilitation, orthopaedic surgery and neurosurgery.

Specialists in physical and rehabilitation medicine are at the heart of this management strategy, in collaboration with the rehabilitation team, neurosurgeons, orthopaedic surgeons, neurologists and paediatricians.

These guidelines address each drug separately and then suggest a decision tree for each type of pathology in the form of algorithms and tables which summarize the dual approach that is required (site-driven and objective-driven). The drugs mentioned in the text are presented in an Appendix.

2. Botulinum toxin type A

Botulinum toxin type A is recommended because there is established scientific evidence of its efficacy in the local reduction of spasticity after intramuscular injection (*Grade A*). It can be used as a first-line treatment of spasticity when the objective is focal or multifocal (*professional consensus*).

In adults, most of the results come from studies on stroke patients and, in children, from studies on patients with cerebral palsy. However, the use of botulinum toxin can be envisaged regardless of the pathology in question (*professional consensus*), since the indication is more symptomatic than aetiological. This is what is anticipated in the product marketing approval (PMA) granted by the French health authorities in adults, although the same approach can be adopted in children.

Botulinum toxin type B may have the same effects but there are currently too few studies to draw reliable conclusions. It is available on the market (as Neurobloc®) but does not have a PMA for this indication.

2.1. The efficacy of botulinum toxin type A

In adults, one observes:

- an improvement in self-care (washing and dressing) (*level of evidence 1* for the arms and the legs);
- an improvement in active motricity in the leg in particular and in gait in general (*level of evidence 2*).

Changes in active function of the arm have not been observed.

In children, one observes:

- an improvement in active arm or leg function, (*level of evidence 2*);
- an effect on pain (*level of evidence 2*).

The prevention of orthopaedic deformation is an important objective and should prompt very early-stage treatment in children.

It should be noted that an antalgic effect *per se* has not been demonstrated; however, the painful consequences of spasticity are reduced.

2.2. Dose

The units differ, there are no international units and there is no recognised equivalence. There is no information concerning the dilution which would enable recommendation of practices other than those covered in the PMA:

- 1 ml for Botox®, 100 Allergan U/ml;
- 2.5 ml for Dysport®, 500 Speywood U/1 to 2.5 ml.

Intramuscular injection is performed, while ensuring that injection into a vessel does not occur.

The recommended total maximum dose is as follows:

- in adults: 500 Allergan U for Botox® and 1,500 Speywood U for Dysport®;
- in children: 20 Allergan U/kg for Botox® and 30 Speywood U/kg for Dysport® (*professional consensus*);
- the recommended maximum dose of Botox® per session is higher than the ceiling dose in the PMA. However, this overshoot appears to be justified when multifocal treatment is required (*professional consensus*).

The recommended doses per muscle differ slightly from those presented in the PMA. By way of an example, three different maximum doses are suggested for three different muscle groups, according to their size (*professional consensus*).

	Botox® Allergan	Dysport® Speywood
	Units	Units
Large muscles, such as the triceps surae	400	1,000
Medium-sized muscles, such as the flexor carpi radialis	100	300
Small muscles, such as the interosseous muscles	20	50

For the first injection, lower initial doses are recommended – especially so in patients with comorbidities (*professional consensus*).

2.3. Safety of use

Injection site localization techniques based solely on anatomical markers are not recommended (*professional*

consensus). Electrostimulation is the most strongly recommended localization technique (*professional consensus*).

A diagnostic electromyogram alone is not sufficient for identifying the muscle. Ultrasound guidance can be used to identify muscles that cannot be accessed via stimulation or non-stimulable muscles or in children, since the technique is painless.

The number of injection sites depends on the muscle's structure and size.

Treatment of patients on antiplatelet agents is possible. As for all intramuscular injections, it is not advisable to inject a patient taking effective doses of an anticoagulant (*professional consensus*).

The use of analgesics is recommended, either locally and/or systemically (local anaesthesia or nitrous oxide) (*professional consensus*). Oral premedication can be used, notably in children (*professional consensus*).

According to good clinical practice, one must distinguish between the patient information consultation and the session during which the injection is performed; this provides the patient with time to think things over.

Monitoring immediately after the injection is not necessary, except in rare cases where general anaesthesia is essential (*professional consensus*). No immediate post-injection complications (apart from pain at the injection site) have been reported.

In children, some rare cases require general anaesthesia – essentially injection into poorly accessible, deep muscles or in the event of behavioural disorders or resistance to antalgics (see the guidelines issued by the French Society for Anaesthesia and Intensive Care). Greater caution is recommended in multi-diseased children with swallowing and/or respiratory disorders.

Traceability of the injected product is strongly recommended: the batch number, the overall dose, the dose per muscle and the dilution.

It is advisable to evaluate the results of the therapy in a consultation 3 to 6 weeks after the first injection. Any subsequent injection should also be followed by an evaluation.

Repeat injections are justified by the toxin's transient effect. The indication of repeat injections (with at least 3 months between injections) should be evaluated according to the benefits and the tolerance, with a review of the dose and the treated muscles. Repeat injections can be continued as long as beneficial effects are observed after each administration. Other long-term therapeutic alternatives (notably surgery) should be envisaged.

There is not enough information to justify recommendation of antibody assays.

The use of a follow-up diary and a patient information sheet is recommended.

The patient and his/her family must be warned of the low but potential risk of adverse effects that can occur during the first 3 weeks after each injection (swallowing disorders and botulinum syndrome) and should be encouraged to consult if in any doubt (*professional consensus*).

Pharmacovigilance studies have not reported any harmful effects of long-term use but the literature does not describe cohort follow-up beyond 2 years. Adverse events must be systematically noted and reported to the pharmacovigilance services.

Lack of treatment efficacy should prompt practitioners to question the indications and/or the technique. A repeated lack of efficacy means that treatment must be withdrawn, even in the absence of other therapeutic alternatives (*professional consensus*).

For injection, prior theoretical and practical training on both the indications and the technique is recommended.

3. Orally administered treatments

3.1. In adults

Two orally administered compounds treatments (baclofen and tizanidine) have shown proven efficacy in reducing spasticity on the Ashworth muscle hypertonia scale.

Tizanidine has received a temporary authorization of use (TAU) in France: it is recommended when baclofen is ineffective, contra-indicated or produces adverse effects (*professional consensus*).

These compounds are not recommended as first-line treatments after a recent stroke, due to their insufficient efficacy and adverse effects. They are recommended as first-line treatments in multiple sclerosis (MS) and spinal cord injury-related spasticity (*Grade B*).

Other molecules (such as dantrolene) have received marketing approval but the age of the studies and insufficient levels of evidence prevent their recommendation on the basis of the literature data.

A number of compounds that lack marketing approval (such as clonazepam and tetrazepam) are used in routine practice. However, there is no literature evidence to support this use.

3.1.1. Efficacy of oral baclofen and tizanidine

A limited number of studies are available. Efficacy is dose-dependent.

There is no evidence that baclofen and tizanidine reduce the functional impact of spasticity. The therapeutic approach must be first local or regional and these treatments must be reserved for problematic, widespread spasticity (*professional consensus*).

3.1.2. Dose

Introduction and adaptation must take place progressively, depending on the efficacy and any adverse effects. All long-term treatments (in a stabilized or non-stabilized patient) must always be reappraised with a periodicity that depends on the condition and its time since onset. Depending on the situation, this reappraisal may include a therapeutic window created by progressively decreasing or increasing the dose.

Regarding the dose of baclofen, it is advisable to remain within the limits set in the marketing authorization (no more than 120 mg per day).

Withdrawal must be progressive and the patient should be warned that if the symptoms worsen, the treatment must be

resumed at the previous dose (*professional consensus*). The dose reduction must be:

- 10 to 15 mg per week for baclofen;
- 4 mg per week for tizanidine (*professional consensus*).

3.1.3. Precautions for use

It is best to consider that the GABAergic agents (baclofen and benzodiazepines) may have a harmful effect on the body during the recovery phase, as has been observed in animal models. This should prompt great caution in patients in the recovery phase (in acute-phase stroke or during an MS relapse).

There is no evidence that a baclofen-tizanidine combination (or any other combination of oral agents) is of value.

3.2. In children

Only baclofen has marketing approval (from the age of 6 upwards). However, the data do not support its use.

Diazepam is frequently used in this indication, despite the absence of a PMA. It can be recommended (*Grade B*), although its GABAergic action should prompt caution and short periods of use (harmful effects on the growing body and in the recovery phase have been observed in animal models) (*professional consensus*).

There is no evidence to suggest that other non-approved molecules that sometimes used (such as tetrazepam) are effective.

4. Intrathecal baclofen (ITB)

Intrathecal baclofen is an effective treatment for spasticity. It can notably be recommended in spinal injury patients and in MS (*Grade A*). It is a long-term treatment with continuous, intra-spinal administration via an implanted pump.

It is mainly recommended for patients whose spasticity of the legs is broadly distributed and sometimes extends to the trunk (*Grade A*).

4.1. Efficacy of intrathecal baclofen

Intrathecal baclofen should be reserved for spasticity which:

- interferes with posture, nursing and rest;
- interferes with personal independence or gait;
- causes pain (professional consensus).

A favourable effect on autonomous hyperreflexia can be expected in spinal injury patients.

4.2. Precautions for use

The presence of osteosynthetic material in or near the spine or the presence of bed sores are not formal contra-indications (*professional consensus*).

It is necessary to ensure good patient compliance with the treatment constraints (*professional consensus*).

The patient and/or his/her family and friends must always be provided with detailed information on the expected benefits and possible risks, notably in terms of the risk of loss of motor function (which can be reversed when treatment is withdrawn).

In children, spinal development should be monitored very closely.

One or more tests (simple injection by lumbar puncture or via a temporary access device) must be performed before implantation of a pump.

The physician who performs the injection must evaluate its efficacy in the following 3 to 4 hours (*professional consensus*).

4.3. Dose

The usually recommended first test dose is 50 μg in adults and 25 μg in children (*Grade B*).

The maximum dose for a test must not exceed 150 μg in adults and 100 μg in children and should be reached after 3 and 4 days, respectively (*Grade B*). The patient's maintenance dose can range from 20 μg to 1,500 μg.

There is usually a requirement to increase the dose in the first 6 to 9 months post-implantation (*professional consensus*). However, this increase must not be considered as related to a tolerance phenomenon but rather as an adaptation to the clinical state.

4.4. Safety of use

The inherent risk in intrathecal baclofen injection is overdosing (vigilance and respiratory disorders). Monitoring (notably of vital signs) by a specialist team must be performed during the 3 hours following the test.

Implantation of the pump, monitoring and follow-up must be performed by a specialist medical and surgical team. It is important to perform maintenance – notably to detect hazards related to the procedure (displacement of the catheter, infection, etc.) and prevent the occurrence of a cessation syndrome. The patient does not necessarily have to have received oral baclofen prior to implantation of a pump.

5. Alcohol and phenol

Alcohol and phenol reduce spasticity (evaluated on the Ashworth scale) by chemical neurolysis (irreversible destruction of the nerve).

These local treatments should not be used on a first-line basis, except in certain cases of particularly widespread and problematic spasticity in which they can sometimes be combined with another local treatment (botulinum toxin) (*professional consensus*).

In children, extreme caution is recommended in subjects under the age of 10 but these treatments can be used (for the nerve contact only) and especially for the obturator nerve, while concentrating on trophic and comfort-related parameters (*professional consensus*).

It should be noted that neither phenol nor alcohol has marketing approval in this indication. Only glycerine phenol

has an indication (as stated by the central pharmacies and pharmaceutical units managed by French public-sector healthcare facilities) in the treatment of severe spasticity, although the AFSSAPS has not evaluated this.

5.1. Efficacy of alcohol and phenol

If the first injection does not provide the expected benefit, this must be considered as failure of the treatment and another type of therapy must then be considered (*professional consensus*).

5.2. Alcohol or phenol?

Glycerine phenol is preferable to normal phenol: the latter diffuses more rapidly and is thus less well tolerated (*professional consensus*). There are no arguments in favour of phenol, compared with alcohol.

5.3. Precautions for use

Local injection must be performed during electrostimulation or ultrasound guidance (*professional consensus*). It should only be performed by specialist medical teams.

Intramuscular alcohol or phenol administration must be prohibited, due to irreversible muscle damage (*professional consensus*).

Nerves with a low sensory activity and high motor predominance can be treated (obturator, cutaneo-muscular, etc.) (*professional consensus*). The treatments of mixed nerves (the body of the ischiatic nerve, the posterior tibial and fibular nerves in the leg and the median and ulnar nerves in the arm) is strictly prohibited, in view of the risk of sensory disorders (*professional consensus*).

It is advisable to perform a motor block before treatment in order to check that the latter is effective (*professional consensus*).

The benefits of alcohol or phenol treatment must be initially weighed up, relative to those of surgery. In fact, alcohol treatment induces fibrosis from the very first injection onwards, making subsequent surgery more difficult. Hence, prior to a second course of alcohol treatment, surgery should be considered - notably if a selective neurotomy is envisaged (*professional consensus*). Iterative alcohol treatment may not complicate subsequent neurectomy.

The patient and/or his/her family and friends must always be provided with detailed information on the expected benefits and possible risks.

5.4. Dose

There are no studies on the dose for injection. Injections must be performed with electrostimulation, once the site has been determined at an intensity below 0.5 milliamps, in compliance with good practice for local and regional anaesthetic blocks (*professional consensus*).

The closer the nerve, the lower the volume.

5.5. Safety of use

This is a potentially painful act and so local or general analgesia should be considered.

Treatment of patients on antiplatelet agents is possible. As for all intramuscular injections, it is not advisable to inject a patient taking effective doses of an anticoagulant.

6. General therapeutic strategy

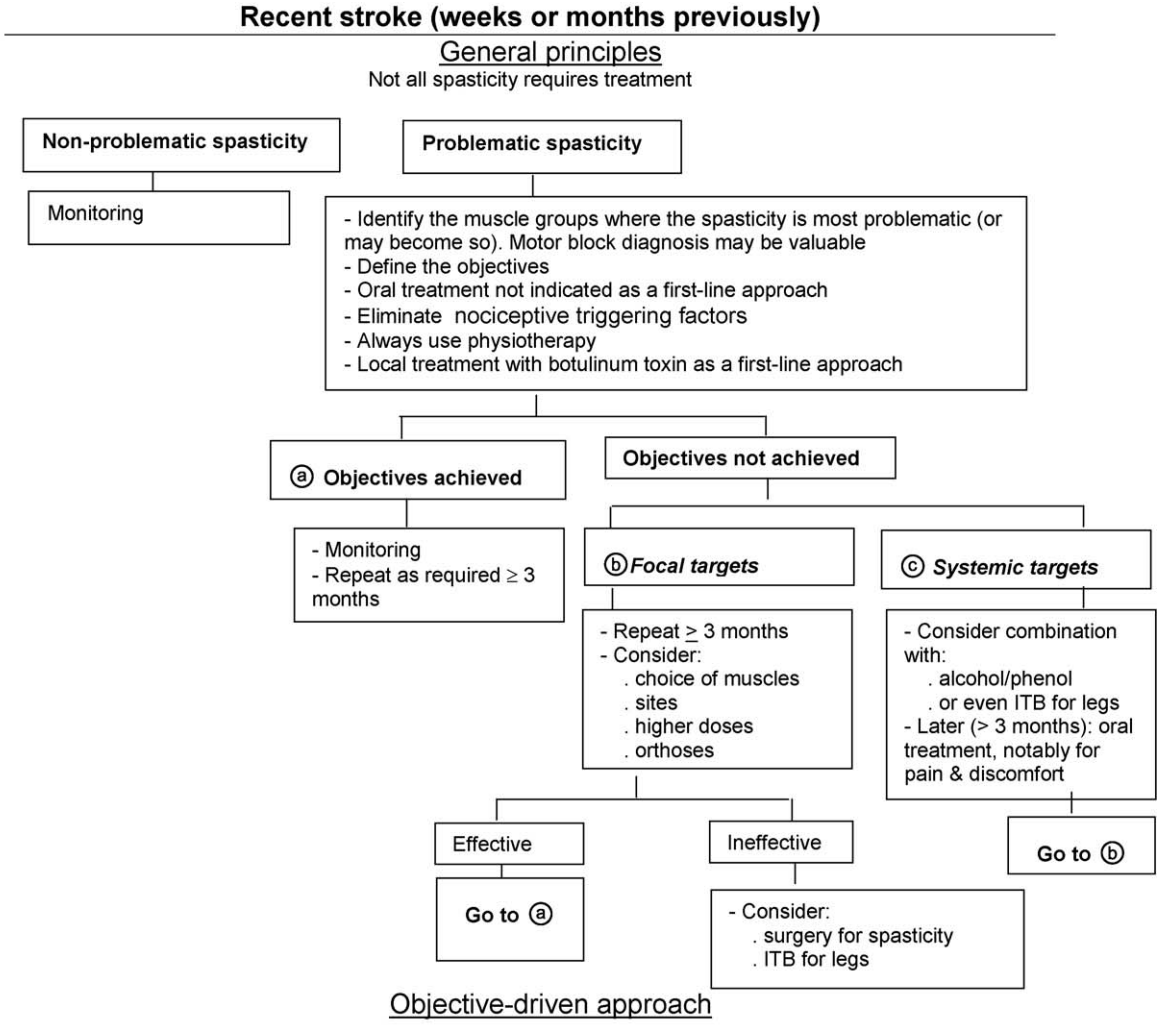
Once the problematic nature of the spasticity has been confirmed:

- the drug treatment of spasticity cannot be envisaged in the absence of other therapeutic modalities;
- physiotherapy is the basic treatment. It often helps avoid muscle retractions but cannot attenuate spasticity in the long term;
- drug treatment can be envisaged:
  - as soon as spasticity is seen to be problematic (and before waiting for potential stabilization of the condition),
  - after have eliminated a possible aggravating, nociceptive cause,
  - after have agreed on precise objectives with the patient,
  - as a function of the localized or widespread nature of the spasticity,
  - when favouring a focal approach,
  - when guided by the performance of a motor block test;
- temporary immobilisation in a posture brace is sometimes useful (notably in children after focal treatment). Careful monitoring is required (notably the status of the skin);
- if correctly administered treatment is ineffective, surgical approaches must be considered.

Algorithms concerning the management of the most frequent spastic situations are presented below.

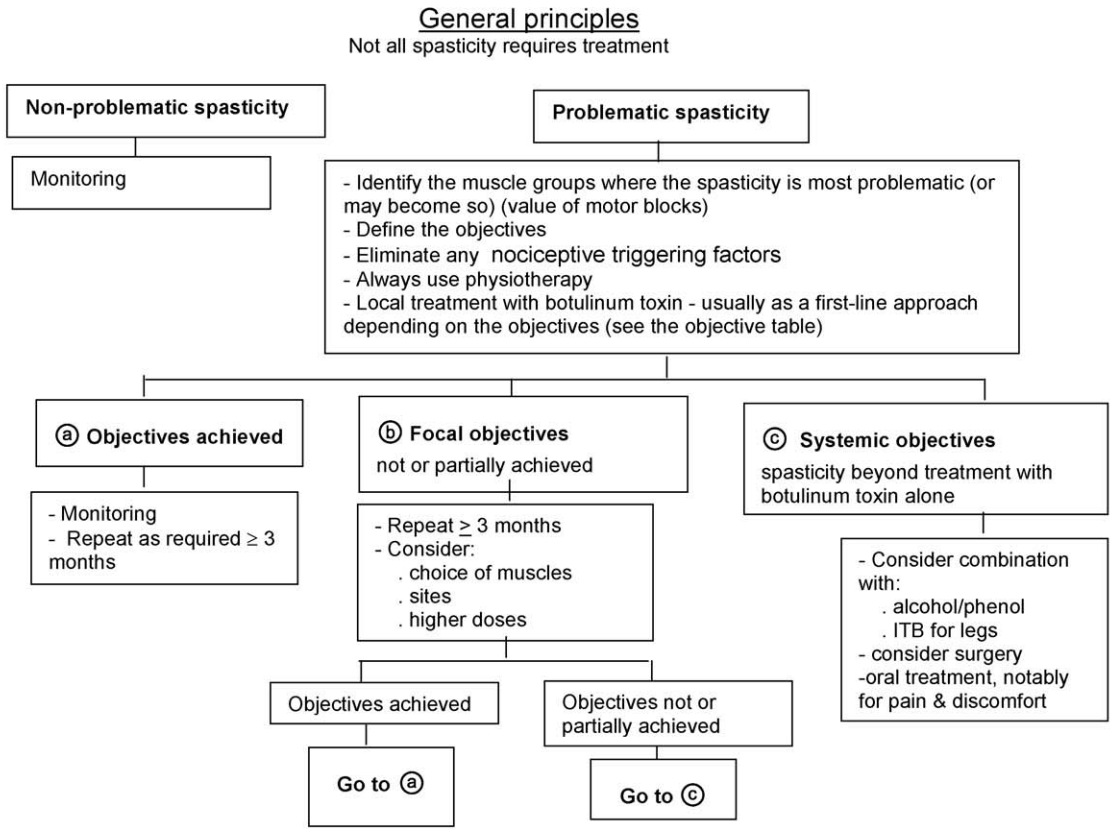
6.1. Lexicon

ITB: intrathecal baclofen



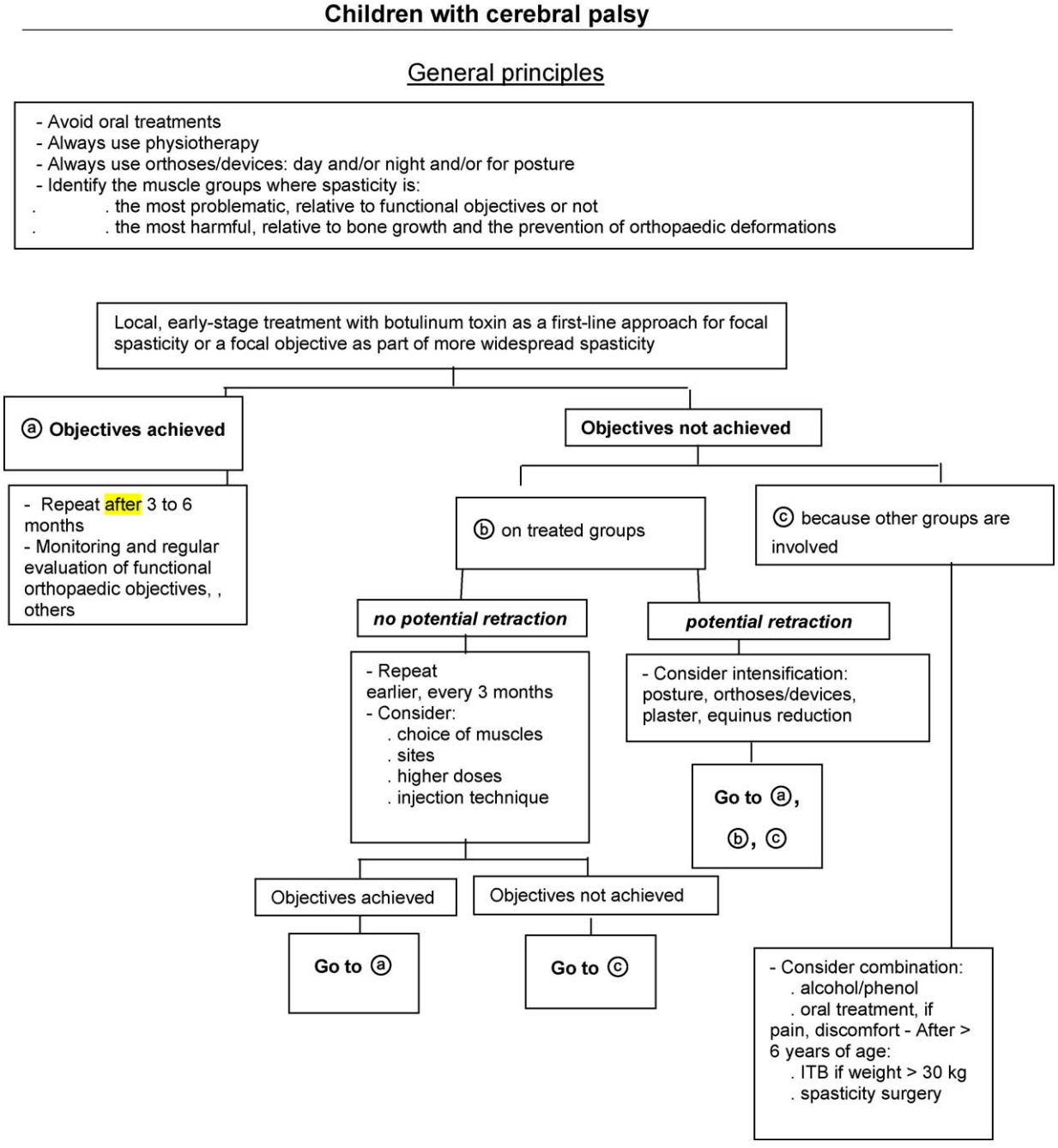
	1=Spasticity: predominant in the arms	2=Spasticity: predominant in the legs	Spasticity: arms and legs
Motricity Fair or good = A	Objectives: ↑ active extension, opening of the hand Treatment: * first-line botulinum toxin * no oral treatment (then according to the flowchart)	Objectives: Improve gait Treatment: * first-line botulinum toxin (then according to the flowchart)	Objectives: Improve function 1 A and 2 A Treatment: * first-line botulinum toxin * optional oral > 3 months * optional alcohol/phenol (then according to the flowchart)
Motricity Null or very impaired = B	Objectives: * prevent orthopaedic and skin complications * pain, washing, dressing Treatment: * first-line botulinum toxin (then according to the flowchart)	Objectives: * Nursing, installation * Prevent orthopaedic and skin complications Treatment: * botulinum toxin * optional alcohol/phenol * consider ITB * or even surgery * motor block diagnosis may be valuable.	Objectives: 1 B + 2 B Treatment: associate * botulinum toxin * alcohol/phenol * optional orthoses * optional oral > 3 months * consider ITB * consider surgery * motor block diagnosis may be valuable. Objectives: 1 B + 2 A Treatment: * first-line botulinum toxin for legs * botulinum toxin or alcohol for arms and consider surgery * optional oral treatment > 3 months * motor block diagnosis may be valuable.

Non-recent stroke (months or years previously)



Objective-driven approach

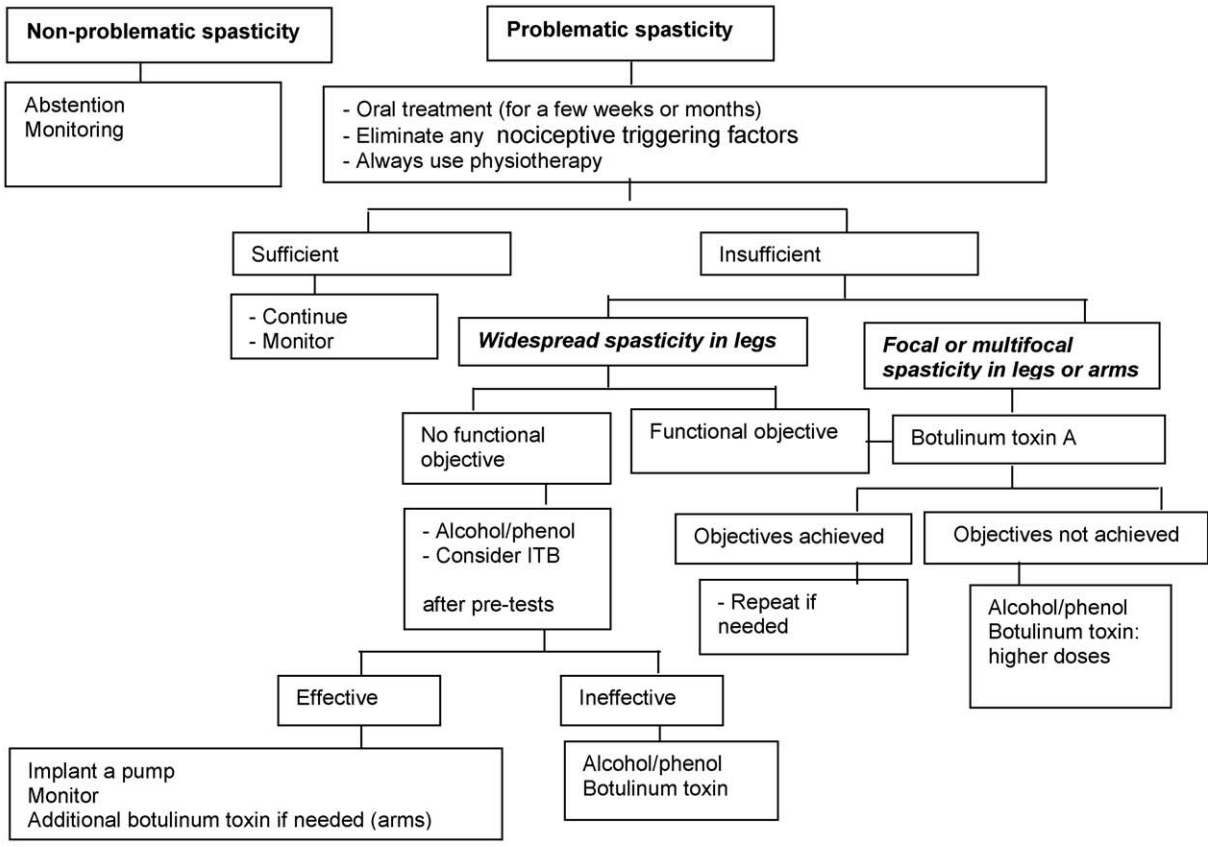
	1=Spasticity: predominant in the arms	2=Spasticity: predominant in the legs	Spasticity: arms and legs
Motricity Fair or good = A	Objectives: ↑ active extension, opening of the hand Treatment: * first-line botulinum toxin * no oral treatment (then according to the flowchart)	Objectives: Improve gait Treatment: * first-line botulinum toxin (then according to the flowchart) * even consider direct surgery * motor block diagnosis may be valuable	Objectives: Improve function 1 A and 2 A Treatment: * first-line botulinum toxin * optional oral treatment * optional alcohol/phenol (then according to the flowchart) * even consider direct surgery * motor block diagnosis may be valuable
Motricity Null or very impaired = B	Objectives: * prevent orthopaedic and skin complications * pain, washing, dressing Treatment: * first-line botulinum toxin (then according to the flowchart) * and/or alcohol/phenol * even consider direct surgery * motor block diagnosis may be valuable.	Objectives: * Nursing, installation * prevent orthopaedic and skin complications Treatment: * botulinum toxin * and/or alcohol/phenol * even consider direct surgery * consider ITB * motor block diagnosis may be valuable	Objectives: 1 B + 2 B Treatment: * optional oral treatment and combine with: * botulinum toxin * optional orthoses * alcohol/phenol * consider surgery * consider ITB Objectives: 1 B + 2 A Treatment: * optional oral treatment and combine with: * *For legs*: first-line botulinum toxin (then according to the flowchart) even consider direct surgery (role of motor blocks) * *For arms*: botulinum toxin or alcohol even consider direct surgery * motor block diagnosis may be valuable


Children with cerebral palsy
General principles
- Avoid oral treatments
- Always use physiotherapy
- Always use orthoses/devices: day and/or night and/or for posture
- Identify the muscle groups where spasticity is:
. . the most problematic, relative to functional objectives or not
. . the most harmful, relative to bone growth and the prevention of orthopaedic deformations
Local, early-stage treatment with botulinum toxin as a first-line approach for focal spasticity or a focal objective as part of more widespread spasticity
ⓐ Objectives achieved
- Repeat after 3 to 6 months
- Monitoring and regular evaluation of functional orthopaedic objectives, , others
Objectives not achieved
ⓑ on treated groups
ⓒ because other groups are involved
no potential retraction
potential retraction
- Repeat earlier, every 3 months
- Consider:
. choice of muscles
. sites
. higher doses
. injection technique
- Consider intensification: posture, orthoses/devices, plaster, equinus reduction
Go to ⓐ, ⓑ, ⓒ
Objectives achieved
Objectives not achieved
Go to ⓐ
Go to ⓒ
- Consider combination:
. alcohol/phenol
. oral treatment, if pain, discomfort - After > 6 years of age:
. ITB if weight > 30 kg
. spasticity surgery

Multiple sclerosis

General principles

Evaluate spasticity, functional capacities and inter-relations.



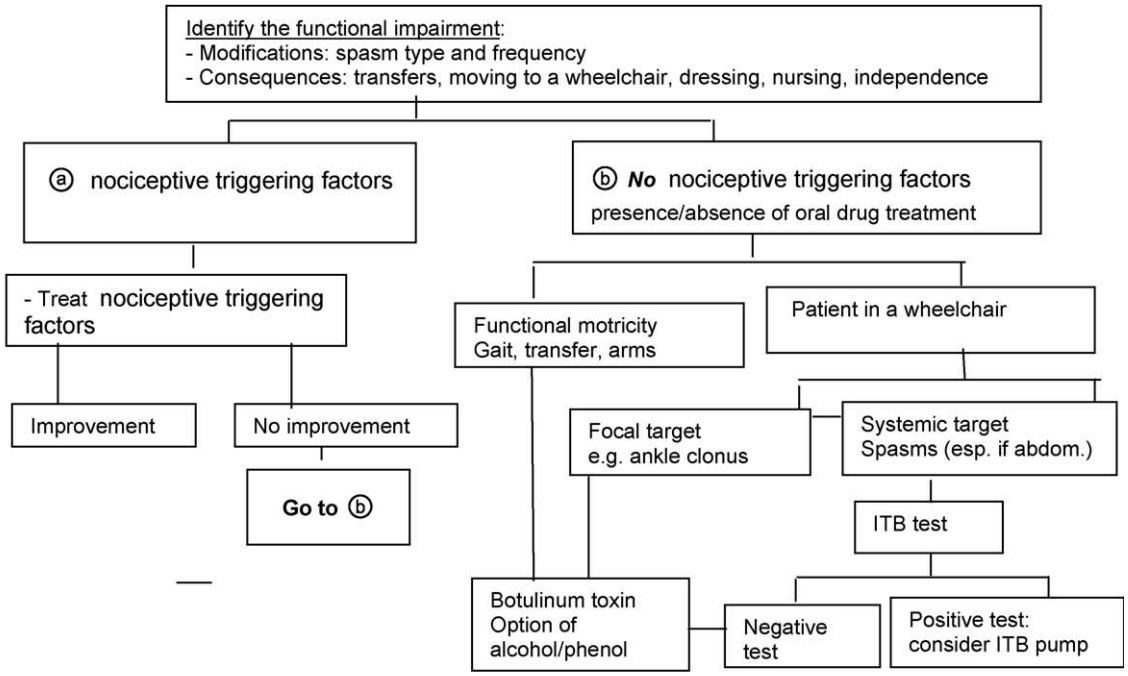
Objective-driven approach

	1=Spasticity: predominant in the arms	2=Spasticity: predominant in the legs	Spasticity: arms and legs
Motricity Fair or good = A	Very rare Objectives: ↑ active extension opening of the hand Treatment: * oral treatment for 2-3 months, then if insufficient: * second-line botulinum toxin at higher doses (then according to the flowchart)	Objectives: Improve gait Treatment: * oral treatment 2-3 months Then, if insufficient: - Focal: * second-line botulinum toxin at moderate to high doses (then according to the flowchart) - Widespread: * ITB? * Botulinum toxin	Objectives: Improve function 1 A and 2 A Treatment: * oral treatment 2-3 months Then if insufficient: - Focal: * second-line botulinum toxin * optional alcohol/phenol (then according to the flowchart) - Widespread: * ITB? * Botulinum toxin
Motricity Null or very impaired = B	Very rare Objectives: - Prevent retractions - Pain, washing/dressing Treatment: * oral treatment for 2-3 months then if insufficient: * second-line botulinum toxin at higher doses (then according to the flowchart)	Objectives: - Nursing - Prevent retractions, sores Treatment: * oral treatment for 2-3 months Then if insufficient: - Focal or multifocal: * second-line botulinum toxin at higher doses (then according to the flowchart) - Widespread: * consider ITB * otherwise botulinum toxin * optional alcohol/phenol	Objectives: 1 A + 2 B or 1 B + 2 B Treatment: * oral treatment for 2-3 months Then if insufficient: - Focal or multifocal: * second-line botulinum toxin at higher doses (then according to the flowchart) * optional alcohol/phenol - Widespread: * consider ITB * and/or botulinum toxin (arms+) * optional alcohol/phenol

Spinal injury

General principles

Spasticity always present, spasms predominate



An objective-driven approach

Screen for aggravating or triggering factors	Functional motricity (transfer or gait) or arm use	Non-functional motricity, independent in a wheelchair
Aggravating or triggering factors identified: Urinary (infection, IR) Faecal (faecaloma) Joint/joint- or bone-related) Vascular (phlebitis) Neurological (syringomyelia) Other causes	Correct aggravating or triggering factors * consider oral drug treatment while waiting for aggravating or triggering factors to be corrected.	Correct aggravating or triggering factors * consider oral treatment while waiting for aggravating or triggering factors to be corrected.
Aggravating or triggering factors absent or corrected	Seek a focal action: * Botulinum toxin * consider alcohol treatment (obturator nerve, etc.)	Seek a more systemic action Perform a ITB test: - positive test and patient willing to accept the constraints = implantation of an ITB pump - negative test or patient unwilling to accept the constraints of ITB = * botulinum toxin * consider alcohol treatment (obturator nerve) * consider oral drug treatment * consider neurosurgery