Last name:
First name:
DOB:
Treated for:

Mucopolysaccharidosis (MPS)

MPS I, MPS II, MPS III, MPS IV, MPS VI, MPS VII, (MPS IX)

For anaesthesia requiring intubation, contact the referring team
Essential precautions when manipulating the cervical spine (risk of compression)

1 TESTS and/or treatment to be initiated in an emergency

There are no specific emergency tests or treatments for MPS. Emergency management is symptomatic and based on the patient's clinical status, taking into account the specific risks of these disorders and any necessary treatment (see below).

2 Pathophysiology

MPSs are lysosomal storage disorders caused by enzyme deficiencies that result in the accumulation of mucopolysaccharides or glycosaminoglycans (GAGs). This accumulation induces tissue dysfunction in the affected organs. Given the extensive distribution of these compounds, the clinical manifestations of MPSs are multisystem, chronic and progressive. There is a continuum between severe and moderate forms in all of these types of MPS. The age of onset of the first symptoms depends on the severity of the disease: the signs are often observed from the first months of life, but some forms only become apparent in adulthood.
Different types of treatments for MPSs are used or are currently subject to therapeutic trials. At present, two treatments have been proven effective and are approved for some of these diseases: haematopoietic stem cell transplantation (HSCT) (effective mainly for MPS I) and intravenous enzyme replacement therapy (ERT) (MPS I, II, IV, VI, VII). Enzyme replacement therapy (ERT) is a long-term treatment and is never administered on an emergency basis.
Depending on the form of MPS, ERT may not be indicated or may have to be discontinued.

3 Possible complications associated with MPS (cross out all situations that do not apply to the patient)

• 1/ Implantable port (IP) or Port-a-Cath (PAC):
Some patients have a central line (PAC) for enzyme replacement therapy. If a fever develops, a catheter-related infection must be ruled out and the patient should be advised to go to A&E for an **infectious work-up**: CBC, CRP, PCT, blood cultures from PAC and peripheral sites +/- other infectious samples depending on the clinic. If a PAC infection is suspected, **anti-staphylococcal antibiotic treatment** should be initiated in accordance with the local protocol (e.g. vancomycin IV: loading dose of 15 mg/kg over 60 min, then maintenance dose of 45 mg/kg/day continuously +/- gentamicin IV: 8 mg/kg/day in a single infusion over 30 min +/- local antibiotic lock). **Due to the associated valvular involvement, remember to test for endocarditis.**

• 2/ ENT and respiratory involvement:
MPS is characterised by **progressive infiltration of the entire airway**, leading to macroglossia, tonsillar/adenoid hypertrophy and, in older children or adults, tracheal infiltration. Patients may also develop chronic restrictive and/or obstructive respiratory failure. Non-invasive ventilation may sometimes be required. **Caution: these patients are difficult to intubate** (see overleaf).
In the event of acute respiratory symptoms: examine the oral cavity and oropharynx (if necessary, with the help of an ENT specialist), perform blood gas analysis and chest X-ray. If fever is present, nasal PCR testing may be performed and antibiotic treatment is often prescribed. Some patients with frequent respiratory decompensation require alternating antibiotic treatment. Topical corticosteroid sprays and/or short courses of systemic corticosteroids help reduce inflammation and oedema in the upper airways.

• 3/ Cardiac involvement:
Cardiac complications are common (even in moderate forms) and may include valvular disease (mainly aortic and mitral valves), hypertrophic cardiomyopathy, conduction disorders or arrhythmias. Signs of myocardial ischaemia have also been reported in some cases. **In the event of acute cardiac symptoms:** perform an ECG (+/- Holter monitor), troponin test, cardiac ultrasound and seek cardiology advice. Some patients have a prosthetic heart valve. In cases of valvular disease, antibiotic prophylaxis for endocarditis should be proposed in accordance with current recommendations.

• 4/ Neurosurgical particularities:
There are two possible acute or sub-acute situations:
- **Hydrocephalus** (vomiting, headaches, increased head circumference, balance problems, etc.): perform brain imaging tests. A ventriculoperitoneal (VP) shunt may be necessary. If the patient has a ventriculoperitoneal shunt, these symptoms suggest valve obstruction.
- **Upper or lower spinal cord compression** due to C1/C2 instability or related to thoracolumbar kyphoscoliosis (recent micturition problems, pyramidal syndrome, motor or sensory problems, pain, etc.).

In both cases, an emergency neurosurgical opinion is recommended.

4 Drug Contraindications / General Advice

- An ERT infusion may be cancelled or postponed if the situation makes its administration impossible.
- All recommended vaccines, including influenza and COVID, should be administered. For bone marrow transplant recipients, the vaccination schedule should be discussed with the transplant team and the referring doctor.
- There is no specific diet.
- No drug contraindications

SURGERY and/or ANAESTHESIA:

As these patients are prone to macroglossia, infiltration of the upper, middle, and lower airways and potential tracheal stenosis, a morphology with a short neck, and are at risk of bronchospasm, they are often difficult to intubate, ventilate and extubate. In an emergency, endoscopically guided intubation or even tracheostomy may be discussed.
If possible, intubation should be performed in the presence of an ENT specialist and in a hospital with expertise in managing these patients.
Care must be taken with neck flexion/extension, and the cervical spine must be handled with great care due to the high risk of C1/C2 spinal cord compression (C1/C2 instability, spinal canal stenosis linked to dysostosis, odontoid hypoplasia, etc.), leading to a risk of permanent paraplegia.

- The risk of respiratory decompensation must be considered before any anaesthesia. Some patients have contraindications to intubation.
- A list of preoperative tests should be drawn up (see below). Local or loco-regional anaesthesia should be favoured, bearing in mind that intubation may be necessary in the event of complications. If multiple surgical procedures are required under general anaesthesia, it is recommended to perform them in one session of anaesthesia.

- **After surgery**: close monitoring of respiratory function in the ICU; long-term non-invasive ventilation may be indicated. Risk of airway obstruction and pulmonary, laryngeal or lingual oedema, even some time after extubation. These risks must be explained to the family before the procedure.

- **Examinations recommended before the administration of any general anaesthetic, to be determined according to age and type of MPS:**
  - Tracheal scan (to check for tracheal deformity and stenosis)
  - ENT examination with nasofibroscopy
  - Polygraphy or Polysomnography (assessment of OSA)
  - Cardiac ultrasound (annual)

Patients in palliative care/limitation of treatment/end-of-life support:

- Some patients have severe multisystem and/or neurocognitive impairment with progressive deterioration, requiring a limitation of non-beneficial invasive therapies.
- These patients are usually managed in collaboration with a comfort/palliative care team.
- ERT infusions may be stopped (lack of benefit, infusion-related reactions, etc.).
- Appropriate and optimal analgesia must be provided, particularly to limit respiratory deterioration.
- Some patients have a medical information sheet for the emergency team regarding what to do in the event of acute deterioration (agreed care plan).

View the **Emergency page** on the G2M website

REFERRING DOCTORS AND CONTACT DETAILS

On-call telephone numbers for metabolic emergencies of:

At night, only the medical teams can call in emergency situations and only if the emergency certificate has not been understood or if the patient's clinical condition or test results are concerning. Where possible, calls should be made before night time.
Secretarial issues are handled by the medical secretariat during the week or by email to the patient's referring metabolic doctor.

Certificate issued on Dr