

Anaesthesia recommendations for **Madelung's disease**

Disease name: Madelung's disease

ICD 10: E88.89

Synonyms: Launois-Bensaude syndrome, Benign symmetrical lipomatosis, Multiple symmetrical lipomatosis

Disease summary: Madelung's disease (MD) is a rare disorder affecting predominantly middle-aged males in Mediterranean areas, with a reported male to female ratio from 15:1 to 30:1. It is characterized by diffused symmetrical non-encapsulated lipomas involving maxillofacial region, neck, shoulder, thorax and head. Masses are normally asymptomatic, causing cosmetic deformity, neck immobility and compression symptoms, such as dyspnoea, dysphagia, dysarthria, hoarseness, and obstructive sleep apnoea. Distribution of lipomas is variable and is often indistinguishable from other diseases, such as certain types of morbid obesity, encapsulated lipomas, Cushing syndrome, lymphoma or angiolipomatosis. Therefore, prevalence may be higher than suggested by literature. The aetiopathogenesis remains unclear. Some factors, such as defects in lipolytic pathways in response to catecholamine, mitochondrial dysfunction, reduction of inducible nitric oxide synthase, and abnormal proliferation of brown fat cells may be involved in the development of the disease. One of the main predisposing factors is alcohol abuse, since approximately 60–90% of MD patients suffer from alcoholism. Chronic alcohol ingestion affects the beta-adrenergic receptors, disrupting lipolysis and affects enzymatic processes in the mitochondria. Because of its association with alcohol consumption, MD may be associated with many comorbidities, such as hepatic disorders, arterial hypertension, dyslipidaemia, diabetes mellitus, polyneuropathy, hypothyroidism, macrocytic anaemia, nephropathy, hyperuricaemia, idiopathic thrombocytopenic purpura or oral cancer. Diagnosis is established through clinical history and physical examination. Imaging tests complete diagnosis and exclude the presence of tumours affecting soft tissues. Surgical removal of the adipose masses remains the only effective treatment option. Nevertheless, because of the characteristics of the diffuse and infiltrative lipomas, complete excision cannot be performed and recurrence is common after surgical treatment. No spontaneous regression of masses has been reported, but alcohol abstinence may delay the progression of the disease and prevent recurrences. The main anaesthetic concern in the treatment of patients with MD is the elevated risk for difficult intubation and a higher risk of postoperative bleeding, because of the difficult haemostasis and the involvement of vessels of big masses.

Medicine is in progress



Perhaps new knowledge

Every patient is unique

Perhaps the diagnosis is wrong



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Typical surgery

Surgical removal of adipose tissue, open lipectomy, liposuction, ultrasound-assisted liposuction, combined lipectomy and liposuction.

Type of anaesthesia

There is no recommendation for either general or regional anaesthesia.

Regional or local anaesthesia can be used in masses of limited size when liposuction is performed.

There is no report of spinal, epidural or caudal anaesthesia. However, as MD rarely affects lower limbs or lower body, no difficulties should be found when these types of anaesthesia are possible.

General anaesthesia can be performed using both intravenous or volatile anaesthesia. There is no risk of malignant hyperthermia. Both depolarising and non-depolarising neuromuscular blocking agents have been used. Opioids should be titrated carefully to avoid postoperative respiratory failure.

Patients can be sedated using benzodiazepines, dexmedetomidine or intravenous anaesthetics. The administration of sedatives should be done carefully, ensuring adequate permeability of the airway and monitoring spontaneous breathing, to avoid respiratory failure.

Necessary additional pre-operative testing (beside standard care)

The presence of arterial hypertension can lead to hypertensive cardiomyopathy. Cardiac tests like electrocardiography or echocardiography might be necessary to assess the presence of cardiomyopathies. **Cardiologist assessment should be performed if active cardiac disease is suspected. Treatment with beta-blockers and statins should be maintained perioperatively.**

Laboratory screening for metabolic syndromes could be recommended to assay fasting glucose, cholesterol, triglycerides, thyroid hormones and uric acid. These patients normally present high levels of high-density lipoprotein cholesterol and low levels of low-density lipoprotein cholesterol. Laboratory tests can also show disorders related to chronic alcohol abuse: elevation of hepatic (ALT, AST, GGT) and pancreatic (amylase, lipase) enzymes, macrocytic anaemia, nephropathy and a higher international normalised ratio. In case of liver disorders, the presence of cirrhosis or syndromes related to hepatic dysfunction, such as hepatorenal syndrome, should be excluded. **The patient should be referred to a haematologist if coagulation disorders are suspected to correct preoperative haemostasis.**

The high incidence of perioperative respiratory failure makes it necessary to perform a pre-operative chest radiography to exclude acute lung diseases. It might be helpful to exclude the presence of obstructive sleep apnoea syndrome (OSAS) preoperatively using specific questionnaires or polysomnography.

Ultrasonography, CT or MRI can establish the presence of compression or adhesion to adjacent tissue. These imaging tests are useful when patients show compression symptoms

such as hoarseness, dyspnoea or dysphagia.

The presence of peripheral polyneuropathy, described as sensory, motor, or autonomic dysfunction, makes it necessary to exclude other causes underlying this neuropathy.

Particular preparation for airway management

Airway management of MD patients is challenging due to the characteristics of the disease. The presence of posterior cervical lipomas provokes neck immobility. Besides, neck fat masses and macroglossia reduce the mouth opening and worsens Mallampati classification. Therefore, airway should be secured awake before inducing general anaesthesia, avoiding the danger of airway obstruction after induction of anaesthesia. **Each department should use a “difficult airway management” algorithm adapted to the knowledge and the skills of the personal and the available instruments and techniques.**

Before airway management, preoxygenation through facial mask using oxygen 100% for 4–5 minutes is recommended to increase apnoea time, and proceed safely.

Conventional laryngoscopy has been used, attempting an “awake look” after proper topical anaesthesia. Successful use of awake videolaryngoscopy has also been reported several times using different types of videolaryngoscopes. In patients suffering from giant macroglossia, videolaryngoscopy could be complicated. Thus, as difficult airway management guidelines recommend, awake fibreoptic endotracheal intubation remains the gold standard. However, infiltration of laryngotracheal region by fatty masses makes it difficult to recognise landmarks even when fibreoptic endotracheal intubation is performed. For any attempt at awake endotracheal intubation, proper sedation should be administered under adequate monitoring, ensuring spontaneous breathing.

When airway management fails, laryngeal mask ventilation could be used as a rescue airway, but an endotracheal tube positioned using fibreoptic through laryngeal mask should be used to maintain anaesthesia.

Tracheostomy under local anaesthesia would be difficult due to anterior fat deposits and bleeding risk, which can lead to anterior haematoma that obstructs the airway.

Particular preparation for transfusion or administration of blood products

Postoperative bleeding is frequent in MD patients due to difficult haemostasis and the infiltration of deep tissues. Transfusion of red blood cells or fresh frozen plasma could be indicated to prevent anaemia, maintain haemodynamic stability and promote coagulation if necessary. **ESA transfusion guidelines should be followed for the indication and use of red blood cell, platelets, and plasma products.**

Particular preparation for anticoagulation

The higher risk of postoperative bleeding makes it necessary to decide the risk-benefit ratio of antithrombotic prophylaxis on a case by case basis when there is a possibility of postoperative thrombosis and postoperative immobility. Associated comorbidities may suggest a high risk of thrombosis.

Particular precautions for positioning, transportation and mobilisation

Patients submitted to resection of lipomas located in the dorsal or posterior neck region may require positioning in prone decubitus. In these cases, care must be taken to avoid accidental extubation. It is also important to prevent pressure ulcers in long term interventions.

Interactions of chronic disease and anaesthesia medications

Not reported.

Anaesthetic procedure

Induction of anaesthesia, once the endotracheal tube colocation has already been checked, can be performed using intravenous anaesthetics.

The maintenance of anaesthesia can be safely performed using intravenous and volatile anaesthetics. Propofol, dexmedetomidine, benzodiazepines and sevoflurane have been used without any complication. Opiates should be titrated intraoperatively to avoid postoperative respiratory failure.

Both succinylcholine and non-depolarising neuromuscular blocking agents can be used safely in these patients. No special risk of hyperkalaemia is associated with MD. Antagonisation of neuromuscular blockade is recommended to diminish postoperative residual neuromuscular block.

Lung-protective ventilation strategies using low tidal volume, positive end-expiratory pressure and intermittent recruitment manoeuvres are recommended. Pulmonary compliance might be reduced in these patients because of the presence of lipomas in the upper thorax. It would be recommended to monitor intraoperative airway pressures.

Multimodal postoperative analgesia, combining nonsteroidal anti-inflammatory drugs, weak opioids and wound infiltration with local anaesthetics is a good option to diminish opiate doses.

Particular or additional monitoring

Standard monitoring, using electrocardiography, peripheral oxygen saturation, end-tidal CO₂ and non-invasive arterial pressure are needed.

In case of lipomas located in the region of the arm where non-invasive blood pressure measurement is performed, invasive arterial pressure might be recommended. Besides, artery canalisation makes it possible to perform gasometric analyses, monitor arterial oxygen and early diagnosis of postoperative respiratory failure and haemodynamic instability.

Due to the high risk of postoperative respiratory failure, monitoring of neuromuscular blockade is recommended to avoid postoperative residual neuromuscular curarisation.

Monitoring anaesthetic depth is recommended, since anaesthetic agents can accumulate in fatty masses and prolong anaesthesia time unnecessarily.

Possible complications

Patients with MD have a higher risk of postoperative respiratory failure, due to the presence of masses located in the upper airway. The residual effect of neuromuscular block agents, opiates and hypnotic drugs increases the risk of upper airway obstruction.

Because of the infiltrative nature of non-encapsulated lipomas, soft tissue including nerves and vessels can be affected, making it difficult to perform an appropriate haemostasis. The higher risk of bleeding might make it necessary to transfuse red blood cells or fresh frozen plasma. There is a report of postoperative acute respiratory failure secondary to these transfusion requirements. Besides, the higher risk of postoperative bleeding makes the appearance of neck haematomas possible, increasing the risk of respiratory failure.

Post-operative care

Postoperative close monitoring is recommended, due to the high risk of postoperative respiratory failure or bleeding. Intermediate or intensive care unit supervision for 24 hours will detect the appearance of these complications early.

Using postoperative oxygen therapy or non-invasive ventilation (CPAP) may prevent the appearance of postoperative respiratory failure.

Postoperative laboratory tests may diagnose any bleeding disorders that could lead to a higher postoperative bleeding.

Disease-related acute problems and effect on anaesthesia and recovery

There is no acute manifestation of the disease. The risk of acute postoperative renal failure or respiratory failure might be higher in these patients due to the characteristics of the disease.

Ambulatory anaesthesia

Ambulatory anaesthesia (according to common guidelines) should not be performed in MD patients, due to the need for postoperative monitoring and the high rate of postoperative respiratory failure and postoperative bleeding.

Obstetrical anaesthesia

The presence of MD in females is uncommon and there is no report regarding obstetrical anaesthesia in these patients.

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